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Literature references in [ ] refer to the *Review of Applied Mycology*.
Map references are to the C.M.I. distribution maps of plant diseases.

BATES (G.). **Hot-water treatment of Cane plants at the Northern Sugar Experiment Station.**—*Proc. Qd Soc. Sug. Cane Technol., 1956*, pp. 121–125, 1956.

Some of this information on the hot-water treatment of sugar-cane for the control of ratoon stunting virus in Queensland has been noticed from another source [36, p. 352]. Trials showed that a rise in temperature of 1° C. causes greater damage to the plants than an increase in the time of treatment [cf. 35, p. 235]. Apart from varietal reaction, factors influencing the germination of treated cane are still unknown. The use of ratoon cane rather than plant cane resulted in only slightly better germination. The best type of setts for the treatment appear to be those from mature cane grown under high-land conditions. The mercurial fungicide dip, made concurrently with the treatment or afterwards in cold water, is indispensable, as without it germination of any variety would be poor.

HITCHCOCK (B. E.). **Investigations on insect transmission of two Sugar Cane diseases.** —*Proc. Qd Soc. Sug. Cane Technol., 1955*, pp. 119–122, 1955.

In 1953 and 1954 experiments involving 12 species of Hemiptera and a cane leaf mite (*Tetranychus* sp.) were carried out in Queensland to determine whether chlorotic streak and ratoon stunting viruses of sugar-cane [see preceding abstract] are transmitted by insects. Healthy and diseased plants were grown together in cages with the insects and the healthy stools later transplanted in the field. Chlorotic streak was absent from all the stools tested, some at the first and second ratoon stages, others plant cane. In 1954 seven stools of first ratoon and two of plant cane showed some lesions similar to those of ratoon stunting but they were too few for positive identification of the disease.

RAYSS (T[SCHARNA]). **Nouvelle contribution à la connaissance des Deutéromycètes de Palestine.** [A new contribution to the knowledge of the Deuteromycetes of Palestine.]—*Bull. Res. Coun. Israel, Sect. D*, 5, 1, pp. 37–46, 1955.

This further instalment of the author's critically annotated studies of the mycoflora of Palestine [24, p. 475; cf. 34, p. 821] deals with 50 species of Fungi Imperfecti, including two new ones and one new variety. Mention may be made of the following: *Phyllosticta pirina* on apple, *Ascochyta pisi* [map 273] on *Lathyrus ochrus*, *Septoria gladioli* [cf. 14, p. 193] on *Gladiolus atroviolaceus*, *Microdiplodia palmarum* on date-palm, *Myceliophthora lutea* [cf. 28, p. 268] and *M. sulfurea* on edible mushroom in beds, *Geotrichum candidum* on manure in mushroom beds, *Cercospora apii* [35, p. 59] on celery, *Alternaria citri* on lemon, and *C. handelii* on glasshouse *Rhododendron* sp.

Abrego (L.), Patiño (B.), & Weber (G. F.). **Plant diseases observed in El Salvador during summer, 1955.**—*Plant Dis. Reptr*, 40, 7, pp. 656–660, 1956.

Included among the diseases of major importance in this list of parasitic fungi on cultivated plants in El Salvador, based on observations and experimental work, are avocado scab (*Sphaceloma perseae*) [map 232]; *Puccinia cannae* on *Canna indica* [map 224]; thread blight (*Pellicularia* [*Corticium*] *koleroga*) on coffee [map 64]; damping-off (*Rhizoctonia* [*C.*] *solani*) [cf. 36, p. 102] and leaf spot (*Rhizoctonia* sp.) of cotton; leaf smut (*Entyloma dahliae*) on dahlia [map 114]; *Diaporthe vexans* on eggplant; *Guignardia bidwellii* on vine [map 81]; *Helminthosporium oryzae* [*Ophiobolus miyabeanus*] on rice [map 92]; and *Albugo candida* on radish.

Gilbertson (R. L.). **The genus Poria in the Central Rocky Mountains and the Pacific Northwest.**—*Lloydia*, 19, 2, pp. 65–85, 1956.

In this monograph from the College of Forestry, University of Idaho, the author recognizes 64 species of *Poria* [33, p. 564], which he presents in five sections, each with a key. Fifty-three species are omitted on various grounds. *P. prunicola*, *P. subiculosa*, *P. luteoalba*, and *P. alutacea* are reported for the first time in the Pacific Northwest. *P. prunicola* is associated with a white rot of cherry and other *Prunus* spp. in Montana; *P. luteoalba* causes a brown rot of coniferous wood in Montana, Idaho, and Oregon. It is pointed out that *Aporpium caryae* (*P. canescens*) has recently been transferred to the Tremellaceae on account of its cruciately septate basidia (Teixeira & Rogers, *Mycologia*, 47, pp. 408–415, 1955). There is a bibliography of 47 references.

Hansen (H. N.), Zentmeyer (G. A.), & Snyder (W. C.). **The perfect stage of Pestalotia.**—Abs. in *Phytopathology*, 46, p. 637, 1956.

An isolate of *Pestalotia* sp. [35, p. 491] from necrotic areas on an avocado leaf [cf. 17, p. 612] produced perithecia of *Leptosphaeria* in pure culture [at the University of California, Berkeley]. Single ascospore cultures on sterilized rusted rose leaves in water agar produced conidia and subsequently perithecia. Perithecia did not develop on healthy rose leaf medium.

Zogg (H.). **Über die Hysteriaceen-Gattung Bulliardella (Sacc.) Paoli.** [On the hysteriaceous genus *Bulliardella* (Sacc.) Paoli.]—*Ber. schweiz. bot. Ges.*, 66, pp. 19–25, 3 figs., 1956.

The following five species of the genus *Bulliardella* (cf. Lohman, *Pap. Mich. Acad. Sci.*, 23, pp. 155–162, 1938) are described, the first two in some detail: *B. baccarinii*, found in Switzerland and the Alpes Maritimes (France and Italy) on *Picea excelsa* and Scots pine; *B. nitida*, on *Chamaecyparis*, juniper, and pine in Germany; and *B. pulchra*, *B. sphaerioides*, and *B. capensis*. The last two species are regarded as doubtful.

Castellani (E.). **Una nuova specie di Curvularia.** [A new species of *Curvularia*.] —*Nuovo G. bot. ital.*, N.S., 62 (*1955*), 3–4, pp. 553–555, 1956. [Received March, 1957.]

A comparison of the fungus for which the author proposed the name *Curvularia sudanensis* [32, p. 124] with exsiccata of *Helminthosporium sudanense* from the Commonwealth Mycological Institute, Kew, confirmed that the latter is the same as *C. geniculata*. The author's fungus, however, is distinct from this and also from *C. cymbopogi* [loc. cit.], and as it is definitely pathogenic to *Coix lachrymae-jobi* it is considered to be a new species and is named *C. coicis*. It has 4- rarely 5-septate conidia, 26 to 54 by 12 to 20 (mode 42 to 46 by 16 to 20) μ, the third cell being larger than the others with a dark brown wall 4 μ thick, while the terminal cell is subhyaline.

Hille (M.) & Brandes (J.). **Elektronenmikroskopische Untersuchung der Sporenoberfläche einiger Ustilago-Arten.** [Electron-microscopic study of the spore surface of some *Ustilago* species.]—*Phytopath. Z.*, 28, 1, pp. 104–109, 11 figs., 1956.

Electron micrographs at the Institute for Physiological Botany, Brunswick, Germany, revealed certain structural features of the spore surface of *Ustilago* spp. which are not distinguishable under the light microscope. In general the present findings are in agreement with those of previous workers [cf. 30, p. 247; 33, p. 450, *et passim*]. The spores of *U. longissima* are spinose, those of *U. violacea* reticulate, of *U. grandis* verrucose, of *U. tragopogonis-pratensis* closely set with low bumps, of *U. striiformis* spinulose, of *U. hypodytes* finely punctate, of *U. nuda* warted, of *U. avenae* closely echinulate, and of *U. perennans*, often made synonymous with the foregoing, more sparsely and bluntly echinulate. The spore surface was completely smooth only in *U. hordei* (from both oats (*U. levis*) [*U. kolleri*] and barley).

Nishi (Y.). **Studies on the production of local lesions of Nicotiana glutinosa by Tobacco mosaic virus. I. On the influence of ether vapour, nitrogen gas, and temperature relation on the production of local lesions of N. glutinosa.**—*Sci. Bull. Fac. Agric. Kyushu*, 15, 3, pp. 339–344, 1955. [Japanese, with English summary. Received 1956.]

At Kyushu University, Japan, lesions on half-leaves of *Nicotiana glutinosa* which had been treated with ether vapour or nitrogen gas after inoculation with tobacco mosaic virus [cf. 33, p. 640] were less numerous than on the controls, but were more so on those treated with ether vapour before inoculation. The size and number of the lesions was influenced by temperature, being smaller and fewer at 7° to 15° C. than at 20° to 33°.

Takahashi (W. N.). **Increasing the sensitivity of the local-lesion method of virus assay.**—*Phytopathology*, 46, 12, pp. 654–656, 1956.

At the University of California, Berkeley, the writer developed a highly sensitive method of local-lesion assay for use with small quantities of purified tobacco mosaic virus (0·01 to 0·005 μg.). This was achieved by the application (in a manner fully described) of carborundum evenly to the leaves by sieving through fine-mesh nylon taffeta [cf. 36, p. 215], brush inoculation of the tobacco variety Xanthi-nc, containing the necrotic factor from *Nicotiana glutinosa*, and the use of a phosphate buffer [31, p. 474]. In this manner sensitivity was increased 4600-fold over the old method of using *N. glutinosa* without abrasive and the virus in distilled water.

Goodchild (D. J.) & Cohen (M.). **Comparative determinations by electrophoresis, electron microscopy, and local-lesion assay of the growth curve of Tobacco mosaic virus in directly inoculated leaves of Nicotiana tabacum.**—Abs. in *Phytopathology*, 46, 11, p. 636, 1956.

Six expanded leaves on 91 greenhouse tobacco plants were inoculated with 10^{-2} mg. per ml. tobacco mosaic virus and sampled over the ensuing 30 days [at the University of Los Angeles]. Homogenized cytoplasm was analysed electrophoretically, the virus rods were counted by electron microscopy [35, p. 640], and biological activity was determined by local lesion assay on *Nicotiana glutinosa*. This activity was measurable throughout the period of infection, but virus was not detected electrophoretically until five days after inoculation. It appeared from the curves corresponding to the three methods of assay that the specific activity of the virus remains constant throughout its synthesis. The minimum generation time of eight hours was between the second and fourth days of infection.

Rappaport (I.) & Wildman (S. G.). **Growth of Tobacco mosaic virus in lesions produced on Nicotiana glutinosa.**—Abs. in *Phytopathology*, 46, 11, p. 639, 1956.

Leaves of *Nicotiana glutinosa* were inoculated with three strains of tobacco mosaic virus [at the University of Los Angeles, California: 36, pp. 131–137, *et passim*]; viz., common (U 1), mild (U 2) and Holmes's ribgrass (U 8). Each strain spread characteristically, U 1 most rapidly, U 2 intermediate, and U 8 most slowly. The infectivity of extracts rose proportionately to the area of tissue rendered necrotic, U 8 containing significantly more virus per sq. mm. of necrotic tissue than the others; the activity yield of virus from U 2 lesions was lowest.

Bercks (R.) & Gehring (F.). **Über Verwandtschaftsbeziehungen und Konzentrationsverhältnisse bei Viren der Tabak-Ringspot-Gruppe.** [On the connexions of relationship and concentration ratios in viruses of the Tobacco ring spot group.]—*Phytopath. Z.*, 28, 1, pp. 57–69, 2 graphs, 1956.

At the Institute for Virus Serology, Brunswick, Germany, sera were prepared against the potato bouquet and pseudo-aucuba and tobacco ring spot viruses [36, p. 116], and the alterations in their concentration ratio on inoculated Samsun tobacco plants determined by the serological method. The results were in satisfactory agreement with the theories and hypotheses advanced in the literature concerning the course of the disease and external recovery in tobacco infected by viruses of the ring spot group. Judging by their serological properties and behaviour in a premunity experiment, the bouquet and pseudo-aucuba viruses are strains of a single species which are, however, differentiable serologically in a saturation test and on a symptomatological basis.

Only slight affinities between the two ring spot isolates from potato and the true tobacco ring spot virus were indicated by serological determinations and premunity tests. However, by reason of other points of agreement, especially in the course of the disease induced on tobacco, the bouquet and pseudo-aucuba viruses may possibly be regarded as variants of a particular kind of tobacco ring spot virus.

Gerola (F. M.) & Vaccari (E.). **Ricerche sull' attività dei principali enzimi interessati nel ricambio dell' amido in piante sane e virosate di 'Nicotiana tabacum'.** [Researches on the activity of the principal enzymes concerned in the exchange of starch in healthy and virus-affected plants of '*Nicotiana tabacum*'.]—*R. C. Ist. lombardo*, 88, 11, pp. 575–581, 1955. [Received December, 1956.]

In experiments at the Institute of Botany, University of Milan, it was found that in very young leaves of healthy tobacco plants enzymes with a synthetic function predominated, whereas in senescent leaves the amylases were the most active [cf. 36, p. 206]. In tobacco plants affected by [potato] virus X amylase activity was also greatest in senescent leaves and least in young ones. In the green parts of both young and senescent leaves amylase activity was greater in infected than in healthy plants, though rather less in mature leaves; whereas in the yellow parts of healthy leaves there was more amylase activity in young and mature leaves, but rather less in those senescent. In senescent affected leaves, phosphatase activity and phosphorylation were higher than in senescent healthy leaves.

Marcelli (E.). **Note ed osservazioni sulla natura virosica del verderame.** [Notes and observations on the virus nature of 'verderame'.]—*Tabacco*, 60, 680, pp. 212–232, 19 figs., 1956. [English summary.]

After briefly discussing the possible virus origin of the green spot of curing tobacco known in Italy as 'verderame' [34, p. 404] and pointing out that Trotter considered both forms of it, the speckled and the spotted [15, p. 689], to be distinct from the condition termed 'bassarà', the author describes inoculation experiments on

Samsun and White Burley tobacco seedlings at the Scientific Experimental Institute for Tobacco, Scafati.

Inoculations with potato virus X gave rise to a pale green to yellow leaf spotting; after the leaves had been dried bright green spots appeared, which stood out in striking contrast to the yellow background of the leaf blade, the appearance of the leaves being typical of 'verderame'. Similar symptoms were produced by potato viruses X+Y, X+A, Y+A, X+Y+A, and tobacco mosaic virus, the symptoms in the last three cases resembling the speckled form of the condition.

There was no marked difference in the appearance of cured leaves of Virginia Bright tobacco from Yugoslavia with 'bassarà', Italian material naturally infected with 'verderame', and leaves from the inoculated plants; the 'bassarà' material most closely resembled that inoculated with potato viruses X+A, X+Y, and X+Y+A, and the 'verderame' that with potato virus X. Leaves in all three series differed from the healthy in having a thickening of the cuticle and greater development of the palisade cells in the green areas.

It is suggested that the primary cause of the development of the green spots after curing is probably the premature death of the cells, due to various causes, including virus infection, with resultant arrest of enzymatic activity [cf. 15, p. 614]. The condition is becoming progressively more prevalent in Italy both on flue- and air-cured tobacco.

Morgan (O. D.). **Host range studies on Tobacco anthracnose caused by a species of Colletotrichum.**—*Plant Dis. Reptr*, 40, 10, pp. 908–915, 1 fig., 1956.

In greenhouse and field inoculation tests at the University of Maryland Agricultural Experiment Station the *Colletotrichum* sp. causing anthracnose of tobacco [24, p. 167; 25, p. 50] attacked numerous weeds and crop plants, many of which are found in or near tobacco beds. Lettuce, tomato, pepper, Jimson weed (*Datura stramonium*), and an unidentified grass in the beds were naturally infected. The types of symptom, such as dry rot of grasses and wilt of lettuce, may explain why these hosts have been overlooked.

Waggoner (P. E.) & Taylor (G. S.). **Dispersal of spores of Perenospora tabacina from Tobacco blue mold lesions.**—Abs. in *Phytopathology*, 47, 1, p. 36, 1957.

A Hirst spore trap set 18 in. above ground in 480 sq. ft. of tobacco seedlings infected by *Perenospora tabacina* [in Connecticut: 35, p. 48] and bearing active lesions showed the first appearance of spores in quantity (240 per cu. m.) on a sunny, windy day at 4.30 a.m. None appeared after 8.30 a.m. First appearance in quantity on cloudy days was at 6 a.m., reaching a maximum of 432 to 5,000 per cu. m. between 9 and 10 a.m. None appeared from 2 to 7 p.m. or after. In another experiment, in 96 sq. ft. of seedlings with 200 lesions, spores appeared on a cloudy day at 5 a.m., reaching a maximum of 90 per cu. m. at 6 a.m. and being absent after 10 a.m. On two clear days maxima of 6 to 12 per cu. m. occurred between 1 and 5 a.m. Apparently each lesion provides on average less than one spore per cu. m. at 18 in. height.

Todd (F. A.). **Experiments on Tobacco blue mold control.**—*Tech. Bull. N.C. agric. Exp. Sta.* 111, 17 pp., 5 figs., 1955. [Received 1956.]

Fungicide tests over a seven-year period in North Carolina showed that zineb (2 lb. to 100 gals. spray and 6·5 per cent. dust) [cf. 34, p. 405] and ferbam (3 to 100 and 11·4 per cent.) [cf. 33, p. 640] effectively controlled blue mould (*Peronospora tabacina*) [35, p. 48] of tobacco. Zineb was rather more effective, both for control and for increased plant growth [cf. 31, p. 462], but occasionally caused slight injury.

Manzate ($\frac{1}{2}$ to 100), vancide (2 to 100 and 6 per cent.), and fermate (4 to 100 and

15 per cent.) [26, p. 268] were equally effective and caused no injury, but higher rates of manzate were harmful. Phygon ($\frac{3}{4}$ to 100 and 1 to 100) and experimental fungicides 5379 and 5400 (each 2 to 100 and 4 to 100) were also effective, but caused slight to severe injury. Cadminate, ineffective at $\frac{1}{4}$ to 100, was effective and harmless at $\frac{5}{8}$ to 100. Concentrate ferbam spray mixtures at lower dosages reduced but did not control incidence; actidione (2, 5, and 20 p.p.m.) and thiolutin (30 per cent. mixture of zinc dithiocarbamate and 2 mercaptobenzothiazole, 240 p.p.m.) sprays were ineffective.

Moore (E. L.) & Clayton (E. E.). **Dixie Bright 28, a high-yielding, bacterial wilt-resistant, flue-cured Tobacco variety.**—*Bull. N.C. agric. Exp. Sta.* 393, 11 pp., 2 figs., 1954. [Received December, 1956.]

Much of the information in this bulletin about the tobacco variety Dixie Bright 28 has already been noticed [33, p. 54]. In tests over a period of five years resistance to *Pseudomonas solanacearum* was similar to that of Dixie Bright 27 and slightly less than that of Oxford 26 [loc. cit.].

Moore (E. L.), Drolsom (P. N.), Todd (F. A.), & Clayton (E. E.). **Black shank resistance in flue-cured Tobacco as influenced by tolerance to certain parasitic nematodes.**—*Phytopathology*, 46, 10, pp. 545–550, 3 figs., 3 graphs, 1956.

It has been found in North Carolina that the resistance of the high yielding Dixie Bright 101 tobacco variety to black shank (*Phytophthora parasitica* var. *nicotianae*) [35, pp. 93, 493] is often seriously lowered by nematode attack (*Meloidogyne* spp., *Pratylenchus* spp., and *Tylenchorhynchus claytoni*). In two fields 75 to 95 per cent. of the plants were killed in 1951. In experiments at the North Carolina State College, Raleigh, and the Tobacco Research Station, Oxford, it was found that by crossing the black shank-resistant but poor yielding Dixie Bright 102 with a number of genotypes resistant to nematodes, particularly Bottom Special and Hicks, the F_5 and F_6 produced some high-yielding resistant varieties not so affected by nematode attack. Thus 3006–5 from the Hicks cross lost only 12 per cent. from black shank compared with 68 per cent. of Dixie Bright 102. In 1954 the new lines surpassed Dixie Bright 101 in yield by 13 to 30 per cent.

Husain (A.) & Kelman (A.). **Pectic enzymes of Phytophthora parasitica var. nicotianae, the cause of black shank of Tobacco.**—*Plant Dis. Reptr*, 40, 7, pp. 629–631, 1 graph, 1956.

In studies at the North Carolina State College, Raleigh, on wilting of tobacco plants affected by black shank (*Phytophthora parasitica* var. *nicotianae*) [34, p. 326] a polygalacturonase causing rapid loss in viscosity of a 1·2 per cent. sodium polypectate solution was detected in two-week-old liquid culture filtrates of the fungus. Chemical assay of the enzyme revealed that reducing groups formed in small amounts only after prolonged incubation. Polygalacturonase activity may be capable of producing deposits of pectic substances in vessels of diseased tobacco plants.

Lautz (W.). **Efficacy of soil treatments with nine chemicals in Tobacco black shank control.**—*Plant Dis. Reptr*, 40, 10, pp. 855–860, 1956.

In greenhouse tests carried out by the United States Department of Agriculture from 1952 to 1955 tobacco plants of the variety 402 were grown in soil infested with *Phytophthora parasitica* var. *nicotianae* [35, p. 493]. Of the various treatments applied before transplanting, methyl bromide at 1 lb. per 100 sq. ft. and, as soil drenches, dithane D-14 (1 gal. in 50 gals.), formaldehyde (1 in 25), and vapam (Stauffer N-869, 1 in 40) gave the best control of black shank. Urea, sodium azide, and allyl bromide were effective only in one test and sometimes caused injury

which, however, was reduced by allowing the soil to stand for two or three months before transplanting.

EBBEN (M[ARION] H.) & WILLIAMS (P. H.). **Brown root rot of Tomatoes. I. The associated fungal flora.**—*Ann. appl. Biol.*, 44, 3, pp. 425–436, 1 pl., 9 graphs, 1956.

After noting previous investigations into brown root rot of tomatoes [cf. 32, p. 607] which, though indicating no specific causal organism, show the value of soil sterilization, the authors present the results of a survey made at the Glasshouse Crops Research Institute, Rustington, Sussex, of the fungal flora of the roots of Potentate tomatoes. The survey was made throughout the year in two glasshouse plots, one of which had been steam-sterilized the previous autumn, while the other had been treated with 2 per cent. formaldehyde.

Three types of root lesion were noted: a cortical rot of the fine roots and medium-sized laterals; corky root (development of furrowed, corky bark, often over 15 cm. of root); and a brown cortical rot of the stem base at and just below soil level. Isolations showed that 75 per cent. of the lesions from roots in unsteamed soil and 52 per cent. of those from roots in steamed soil were colonized by fungi. The species most commonly isolated were *Colletotrichum atramentarium* [35, p. 655], *Volutella ciliata*, and *Cephalosporium* spp.; *Chaetomium cochlioides* and other *Chaetomium* spp. were found frequently, and *Fusarium* spp. occasionally. *Colletotrichum atramentarium* was usually associated with dark brown lesions on medium and small roots from which the cortex sloughed off.

Inoculation experiments with seedlings *in vitro* showed that *Chaetomium cochlioides* and *Petriella asymmetrica* could infect radicles, but on older plants growing in soil *Colletotrichum atramentarium* was the only effective pathogen. Culture filtrates from *C. atramentarium* significantly decreased root growth *in vitro*, some depression also being produced by filtrates from cultures of *Chaetomium cochlioides* and *P. assymmetrica*. Filtered leachates from a loam-manure mixture gave a greater decrease in growth of root tips than those from loam alone, and when autoclaved caused marked depression.

In the soil used the primary pathogen was *Colletotrichum atramentarium*, though the succession of other fungi seemed to play some part in the disease. It seems likely that *C. atramentarium* persists below the steamed horizon. Sclerotia dormant in the soil are apparently stimulated into active growth by living roots; the delay in the appearance of this fungus in steamed soil may possibly be due to the time required for tomato roots to penetrate below the steam horizon and for the fungus to make active growth upwards. The soils in which decay of tomato roots is most severe would appear to be those which are also most inhibitory to new root development; possibly, steam sterilization decreases root rotting not only by reducing the soil microflora but also by breaking down some antagonistic organic substances in the soil.

COX (R. S.) & HAYSLIP (N. C.). **Progress in the control of gray mould of Tomato in South Florida.**—*Plant Dis. Reptr*, 40, 8, pp. 718–726, 3 figs., 1956.

In field tests for the control of grey mould (*Botrytis cinerea*) of Manalucie tomatoes in Florida [35, p. 50; cf. 36, p. 139], 50 per cent. dichlone at $\frac{3}{4}$ lb. per 100 gals. and ferbam (fermate, 4 lb.), 15 applications in one experiment on staked plants and 18 on unstaked, were consistently effective, though the former caused injury when applied on hot days. Vancide 51 (2 qt.), tennam (manganous dithiocarbamate, 2 qt.), and thiram ($1\frac{1}{2}$ lb. thylate) showed excellent results on unstaked tomatoes, but tennam caused slight and vancide 51 moderate foliar injury, and both reduced yields. Repeated spraying with nabam plus metal salts increased the incidence of *B. cinerea*, and also caused light to moderate leaf chlorosis according

to the salts used. With a mixture of dichlone and nabam-zinc sulphate incidence was about the same as in the untreated, but phytotoxicity was higher than with dichlone alone.

MADRAMOOTOO (H.). **Grafting Tomato to resist wilt.**—*Trop. Agriculture, Trin.*, 34, 1, pp. 65–66, 1957.

Bacterial wilt [*Pseudomonas solanacearum*] is a major disease of the tomato in British Guiana [cf. 29, p. 64]. In the absence of wilt-resistant strains or other effective treatment the growers have resorted successfully to the practice of wedge-grafting scions on to rootstocks of the related indigenous plants *Solanum demerarense* and *S. juripeda*.

BARNETT (H. L.). **Variation in the Oak wilt fungus, Endoconidiophora fagacearum.**—*Proc. W. Va Acad. Sci.*, 27 (1955), (*Bull. W. Va Univ.*, Ser. 56, 12–5), pp. 25–29, 4 figs., 1 graph, 1956.

Studies at West Virginia University showed the oak wilt fungus (*Endoconidiophora fagacearum*) [*Chalara quercina*: 34, p. 114; 35, p. 729] to be represented by a large number of individuals greatly varying in agar culture in appearance, sporulating ability, sexuality, and physiological activity. The fact that a pathogenic, albino mutant was found in the field indicates that the fungus may be overlooked if identification is based only on macroscopic appearance of the cultures. The mutation involving loss of femaleness is frequent and has been observed repeatedly in ageing cultures and was induced by ultra-violet irradiation. The ten isolates studied differed in several physiological activities, most particularly in vitamin requirements.

STAMBAUGH (W. J.) & NELSON (J. C.). **Observations concerning autumn infection of Oak by Endoconidiophora fagacearum Bretz.**—*Plant Dis. Reptr*, 40, 8, pp. 750–751, 1956.

Further support for the hypothesis of autumn infection of oak by *Endoconidiophora fagacearum* [*Chalara quercina*: 36, p. 142] was obtained when 92 infection areas in Perry County, Pennsylvania, were examined in late 1955 and again in the spring of 1956. On the first occasion no disease symptoms were observed, but on the second *C. quercina* was isolated from 13 trees which had failed to leaf. Symptom expression was similar to that of trees artificially inoculated in September. Premature leaf reddening may occur in the autumn but it is not a reliable symptom for field diagnosis.

STAMBAUGH (W. J.) & FERGUS (C. L.). **Longevity of spores of the Oak wilt fungus on overwintered nitidulid beetles.**—*Plant Dis. Reptr*, 40, 10, pp. 919–922, 1956.

At the Department of Botany and Plant Pathology, Pennsylvania State University, dead or dormant nitidulid beetles collected from fresh, naturally-formed mycelial mats of the oak wilt fungus (*Endoconidiophora fagacearum*) [*Chalara quercina*: 34, p. 757] or artificially contaminated with spores were stored during the winter in the duff layer of the forest floor. Conidia in or on the insects survived a maximum of 94 days and ascospores 151 days. It is concluded that nitidulids may still carry viable spores at the end of their winter hibernation.

TOOLE (E. R.). **Heartrot in bottomland Red Oaks two years after inoculation.**—*Plant Dis. Reptr*, 40, 9, pp. 823–826, 2 figs., 1956.

In studies at the Delta Experimental Forest, Stoneville, Mississippi, 50 bottomland red oaks (*Quercus phellos* and *Q. nuttallii*), were inoculated with *Fomes geotropus* [24, p. 435], 50 with *Polyporus fissilis* [loc. cit.], and 50 with *P. hispidus* [34, p. 683], the inoculum, on sterilized oats, being inserted in a $\frac{1}{2}$-in. hole drilled

into the heartwood. One year after inoculation, both *F. geotropus* and *P. hispidus* had spread about 1·5 in. above and below the inoculation point, and *P. fissilis* about 2·5 in. above and 2·6 below. After two years, *P. hispidus* had achieved the greatest spread, 17 per cent. of inoculated trees having small, well-defined cankers around the holes.

Fergus (C. L.). **Some observations about Polyporus dryadeus on Oak.**—*Plant Dis. Reptr*, 40, 9, pp. 827–829, 5 figs., 1956.

At the Pennsylvania State University, University Park, in 1953, *Polyporus dryadeus* [cf. 10, p. 141; 28, p. 364] was isolated from the decayed wood of two over-mature scarlet oaks (*Quercus coccinea*), which had suddenly died. As rainfall in the summers of 1952 and 1953 had been deficient it was concluded that, with their root systems reduced by infection, the trees had succumbed to low soil moisture. In 1954 a wind-thrown scarlet oak on the base of which small sporophores of *P. dryadeus* had formed during several previous summers, was found to have almost completely decayed roots, but its trunk was sound except for two small areas 6 in. above the soil line. This indicates that the pathogenicity of *P. dryadeus* is low.

Räder-Roitzsch (J. E.). **Der Pappel-Probeanbau vom Jahre 1951 in Süddeutschland. (Ergebnisse und Erfahrungen nach Abschluss der 3. Wuchsperiode.)** [The experimental Poplar cultivation of the year 1951 in South Germany. (Results and experiences at the close of the 3rd period of growth.)]—*Schweiz. Z. Forstw.*, 107, 8–9, pp. 444–457, 1956. [French summary.]

Tabulated results for the first three years of the poplar-growing experiment initiated in South Germany in 1951 showed that of the nine varieties whose performances are being compared, [*Populus*] *marilandica* and *P. gelrica* were the most resistant to [unspecified] bark diseases. All varieties showed increased susceptibility to bark diseases in the second and third years, but it had reached only 4·5 and 5·1 per cent. in the two species, respectively, compared with 12·4 in *P. robusta* II.

Räder-Roitzsch (J. E.). **Beobachtungen über das Auftreten der Cytospora-Krankheit an Jungpappeln.** [Observations on the occurrence of Cytospora disease in young Poplars.]—*Schweiz. Z. Forstw.*, 107, 8–9, pp. 490–503, 1 fig., 1956. [French summary.]

Studies on the occasion of an epidemic of *Cytospora chrysosperma* [*Valsa sordida*: 35, p. 249] on two-year-old poplars in a South German nursery in 1953 indicated that the fungus can be transmitted through the soil by roots and cuttings. The disease caused root malformations, and mycelium was found in apparently unaffected white wood. *V. sordida* was isolated several times. Roots of weak or slightly weakened plants were easily infected in tests, reactions being more decisive than on wounded aerial parts.

Fungicidal treatment of cuttings prior to planting in the nursery is recommended.

The spores germinated best on an acid malt agar medium, equally well in the light or dark.

Dochinger (L. S.). **Maple wilt progress report.**—*Shade Tree*, 29, 6, pp. 1–3 (unnumbered), 1956.

In laboratory studies at Rutgers University, New Jersey, *Verticillium* [*albo-atrum*: 34, p. 496], the agent of wilt of maples [*Acer* spp.], grew best at 75° F. and at pH 6. The toxin believed to cause wilting was extracted from a liquid culture of the fungus and found to be thermostable and independent of light for production.

In organic solvents it was separated into two parts, each dependent on the other for the production of wilt symptoms.

In a two-year survey throughout New Jersey silver maple [*A. saccharinum*] was found to be most frequently attacked (8 per cent.), followed by Norway maple [*A. platanoides*] (2·8), red maple [*A. rubrum*] (1·4), and sugar maple [*A. saccharum*] (1).

For the identification of infected wood in the field specimens were dipped in silver nitrate which turned black the greenish stains caused by *Verticillium*.

In inoculation experiments infection occurred only when the fungus was introduced into the sapwood. Infected pruning tools were able to transmit the disease.

Nitrogen applications increased the rate of spread of the pathogen although symptoms were sometimes masked by the increase in growth of the tree.

In *in vitro* tests *V. albo-atrum* was inhibited by actidione, mathieson 1484, pyridylmercuric acetate, oxyquinoline benzoate, oxyquinoline sulphate, and vancide 51. In preliminary tests chemotherapy of diseased trees by injections of oxyquinoline benzoate showed promise. Phytotoxicity of the substances for their chemotherapeutic value was tested by placing the ends of maple cuttings in solutions of the chemicals.

Holmes (F. W.). **Mapping the trail of Elm diseases in Massachusetts.**—*Res. Rev.*, 5, 2, pp. 10–11, 5 maps, 1956.

Maps are presented showing the distribution in Massachusetts during the last 20 years of Dutch elm disease [*Ceratocystis ulmi*: 36, p. 71], *Cephalosporium* wilt [*Dothiorella ulmi*: 28, p. 6], *Cytospora* canker [*Valsa sordida*: 19, p. 623], and *Verticillium* wilt [*V. albo-atrum*: 30, p. 142], all on elm, and of *V. albo-atrum* on maple [*Acer* spp.: loc. cit.]

Beckman (C. H.). **Production of pectinase, cellulases, and growth-promoting substance by Ceratostomella ulmi.**—*Phytopathology*, 46, 11, pp. 605–609, 4 graphs, 1956.

At the University of Rhode Island, Kingston, the production of certain enzymes and growth factors by *Ceratostomella* [*Ceratocystis*] *ulmi* [35, p. 853] was studied to observe possible parallelism between the role of a pectinase complex in a tree wilt and that observed in the gummosis and wilting of other plants [cf. 26, p. 429; 35, p. 334]. Seven pathogenic isolates of *C. ulmi* were grown on a variety of liquid media and assayed by recognized methods, which are described [32, p. 495; 35, p. 50].

Germinating spores and young hyphae actively produced a pectolytic enzyme of the depolymerase type. The presence or absence of pectin as a substrate had little effect upon the abundant production of this enzyme.

A cellulolytic enzyme of the Cx type was produced plentifully in the early growth of *C. ulmi*, the substrate apparently not affecting this. A cellulase, probably of the C1 type, also appeared to be produced to some extent.

A substance promoting the growth of etiolated pea epicotyl sections was produced by one isolate, probably in considerable amounts, inducing growth comparable to that obtained with 5 p.p.m. of indoleacetic acid.

It is suggested that the factors involved in the production of tylosis in both pathological and normal heartwood are akin, and that a shift in metabolism, such as an increase in carbohydrates affecting the primary cell wall, is involved rather than a more drastic change; thus the production of the two cellulases and pectin depolymerase by *C. ulmi* may be significant. A growth regulator might also prove of importance in tylosis.

Schneider (I. R.). **A selective medium for the routine isolation of Graphium ulmi Schwarz.**—*Plant Dis. Reptr*, 40, 9, pp. 816–821, 2 figs., 1956.

At the laboratory of the Illinois State Natural History Survey, Urbana, the

addition to potato-dextrose agar of 10 p.p.m. streptomycin sulphate plus cycloheximide at 200 or 300 p.p.m. inhibited the growth of several fungi commonly occurring as contaminants during the isolation of *Ceratostomella* [*Ceratocystis*] *ulmi* from elm chips [cf. 35, p. 853]. Development of the pathogen was not affected and it was isolated from more samples on the selective medium than on a medium without antibiotics.

Timell (T. E.). **Effect of Birch dieback on the chemical properties of white Birch wood.**—*Pulp Pap.* (*Mag.*) *Can.*, 58, 1, pp. 97–99, 1957.

Results of studies at McGill University, Montreal, in which the effect of birch die-back [35, p. 130] on the composition and properties of three white birch trees (*Betula papyrifera*) in various stages of decadence was compared to those of a control, showed that the heartwood of all four trees was slightly deteriorated in comparison with the sapwood. The content of α-cellulose, lignin, pentosan, uronic anhydride and alkali solubles, as well as the chain length of the cellulose component, were of the same magnitude. Findings were corroborated by evaluation of the apparent decay in relation to yield and quality of pulp. It is concluded that white birch wood affected by die-back should still be suitable for pulping.

Converse (R. H.). **Eradication of Pecan scab on nursery trees.**—*Plant Dis. Reptr*, 40, 10, pp. 870–871, 1956.

In experiments at Stillwater, Oklahoma, in 1956 for the control of pecan scab (*Cladosporium effusum*) [34, p. 327; 35, p. 511] puratized agricultural spray at 5 pints per 100 gals., applied in March to dormant Burkett in the nursery, completely suppressed sporulation in overwintering stromata on the stems. Aerial mycelium was present on stromata after one but not after two applications.

Thompson (G. E.). **A rust disease of the Smoke-tree new to North America.**—*Plant Dis. Reptr*, 40, 11, pp. 1015–1016, 1 fig., 1956.

A rust disease constituting a new record for North America was observed on smoke trees (*Cotinus coggyria*) in June, 1956, at Athens, Georgia. The causal agent was provisionally identified as *Pileolaria cotini-coggyriae*, previously described only from China [18, p. 552].

Hansen (H. N.). **The perfect stage of Coryneum cardinale.**—Abs. in *Phytopathology*, 46, 11, pp. 636–637, 1956.

Perithecia of a *Leptosphaeria* sp. were found in 1954 in cankers on dead branches of Monterey cypress [*Cupressus macrocarpa*] killed by *Coryneum cardinale* [27, p. 545] in north central California. Single ascospore cultures produced *C. cardinale* and the perfect state was reproduced *in vitro* on sterilized cypress twigs inoculated with conidia or ascospores, the fungus proving to be heterothallic. Non-viable filiform stylospores, presumably spermatia, developed on twigs and in culture. The *Leptosphaeria* has subsequently been found more extensively.

Roth (L. F.), Trione (E. J.), & Ruhmann (W. H.). **Phytophthora root rot of native Chamaecyparis lawsoniana.**—Abs. in *Phytopathology*, 46, 11, p. 640, 1956.

Root rot of *Chamaecyparis lawsoniana* caused by *Phytophthora* [spp.: 35, pp. 336, 406] has affected ornamental plantings for 18 years west of the Cascade Mountains, Oregon, but in 1952 was observed for the first time in wild trees on the south-west coast. By 1954 this infection had spread 75 miles, mainly along the coast and to a lesser extent inland.

Bronchi (P.). **Origine dell' abetina pura artificiale nella Foresta Demaniale di Badia Prataglia in relazione ai recenti danni da 'Fomes annosus' su 'Abies alba'.** [The origin of the pure, artificially planted Fir stand in the State Forest

of Badia Prataglia in relation to recent injury by *Fomes annosus* to *Abies alba*.]—*Monti e Boschi*, 7, 8, pp. 368–373, 4 figs., 1956. [French and English summaries.]

In planted stands of silver fir (*Abies alba*) in the State Forest of Badia Prataglia, Central Apennines, Italy, young plantations (8 to 18 years old) in spaces in old forest stands left by clear felling or wind-throw are severely infected by *Fomes annosus* [cf. 29, p. 185]. Infection is, however, confined to areas where agriculture was once practised. The danger of reafforestation with silver fir in such conditions is pointed out. Control is to be dealt with in a later paper.

Ford (D. H.) & Rawlins (T. E.). **Improved cytochemical methods for differentiating Cronartium ribicola from Cronartium occidentale on Ribes.**—*Phytopathology*, 46, 12, pp. 667–668, 1956.

Two new methods were devised at the University of California, Berkeley, to distinguish between *Cronartium ribicola* [36, p. 147] on white pine [*Pinus strobus*] and *C. occidentale* [26, p. 37] on pinyon pine [*P.* (?) *edulis*]. The first, an improvement on previous methods [24, p. 127], showed that better results were obtained with brome phenol blue at pH 3·4 instead of 7·6. The second, more useful in the field, is the acid fuchsin method of Tarassevitch [26, p. 7], with the stain solution buffered at pH 4·8. (Fresh leaves should be immersed in 70 per cent. alcohol for 15 min. or more before removing the teleuto columns to the stain.) Teleuto columns of *C. ribicola* retain the red stain, whereas those of *C. occidentale* are destained by the buffer, probably due to a difference in the isoelectric points of the proteins in each. This latter method might find application with other fungi that are morphologically similar.

Klotz (K.). **Praktische Auswertung des Mykorrhiza-Problems in der Forstwirtschaft.** [Practical evaluation of the mycorrhiza problem in silviculture.]—*Allg. Forstz.*, 11, 27–28, pp. 362–363, 1956.

The importance of mycorrhiza in silviculture is illustrated by two examples from the Bavarian Forest, Germany. In the flat moorland areas firs [*Abies* spp.] and spruces thrive only with the aid of mycorrhiza, which develop most vigorously in the damp, loose, well-aerated peat bog litter, stagnant water and rapid drying of the litter being equally deleterious. All cultural practices should be directed towards the promotion of mycorrhizal growth in the humus and litter layers.

In the reafforestation areas in the interior of the same forest young firs are dependent on mycorrhiza for their nutrition. Here again mycorrhizal production must be encouraged and any operations likely to interfere with the pH values of the soil avoided.

Schulz (G.). **Exploratory tests to increase preservative penetration in Spruce and Aspen by mold infection.**—*For. Prod. J.*, 6, 2, pp. 77–80, 3 figs., 1956.

Exploratory tests were conducted at the Forest Products Laboratory, Madison, Wisconsin, to determine the effect of heavy mould (*Trichoderma* and [unspecified] yellowish-white, orange-pink, and black-brown species) infection on absorption and penetration of an oil preservative into black spruce and aspen of fence-post size. In both soaking and pressure treatments, preservative absorption and penetration were usually increased three to five times in the foregoing specimens as compared with mould-free or slightly infected material.

Meyer (F. J.) & Gooch (R. M.). **The effect of the oil carrier on the performance of pentachlorophenol treated wood in ground contact exposure.**—*For. Prod. J.*, 6, 3, pp. 117–121, 3 graphs, 1956.

Some of the information contained in this paper on the effectiveness of penta-

chlorophenol [cf. 30, p. 552; 33, p. 270] as a wood preservative has been noticed from another source [34, p. 331].

The southern yellow pine stake tests at Bogalusa, Louisiana, and Saucier, Mississippi [loc. cit.], carried out by the Dow Chemical Co. and Chapman Chemical Co., are discussed in detail. It is concluded that the service life of pentachlorophenol-treated wood when in contact with the ground is greatly influenced by the petroleum solvent, the performance of the wood being, in general, positively correlated with the distillation range of the latter. Characteristics of the carrier, such as aromatic content, pentachlorophenol solvency, gravity, viscosity, and flash point, seem unimportant.

HATFIELD (I.). **Advances in the field of wood preservation in the United States in 1954–55.**—*For. Prod. J.*, 6, 2, pp. 59–62, 1956.

In this review (based on 16 contributions to the relevant literature) the author summarizes and discusses up-to-date information on the increased use of preservative-treated wood; the growing public consciousness of its value; new products and treating techniques; special research projects; new uses for treated wood; and wood-preserving association activities.

Holzschutzlehrgang im Deggendorf. [Wood preservation curriculum at Deggendorf.]—*Pflanzenschutz*, 8, 12, pp. 157–169, 13 figs., 1956.

On 23rd October, 1956, a course of lectures on wood preservation, organized by the Bavarian Institute for Agriculture and Plant Protection, was delivered at Deggendorf, Lower Bavaria, Germany. An introductory survey of the scope and objects of the curriculum by G. BACHTHALER (pp. 157–159) is followed by contributions from H. STEINBERG (pp. 159–162) on the prevention and control of damage to constructional timber by insects and fungi, including *Merulius lacrymans*, *Polyporus vaporarius* [*Poria vaporaria*], the cellar fungus [*Coniophora puteana*], and [unspecified] blue stain organisms; W. ZIMMERMANN (pp. 162–165) on wood preservatives, grouped according to their application for specific purposes; E. GIESEKING (pp. 165–168) on the legal and technical aspects (from the client's standpoint) of superstructural timber preservation in conformity with DIN 68,800; and W. ZIMMERMANN (pp. 168–169) on the toxicology of wood preservatives and hygienic precautions to be observed in handling them.

SASAKI (T.). **Wood-rotting fungi collected in the Tokyo University forest in Chiba prefecture.**—*Bull. Tokyo Univ. For.*, 46, pp. 181–192, 1954. [Japanese, with English summary.]

This paper lists 100 species of 47 genera of wood-rotting fungi of Corticiaceae, Polyporaceae, and related families collected in the Tokyo University Forest, Japan, which is on the Pacific coast of Honshu near the northern limit of the warm temperate forest climax, (mean annual rainfall 2,368 mm.), but with many southern species represented. The trees were predominantly oak (*Cyclobalanopsis* [*Quercus*] *stenophylla*).

SHIMAZONO (H.) & MATSUOKA (S.). **Variation of the moisture content and loss in weight of wood in the decay-resistance test.**—*J. Jap. Wood Res. Soc.*, 2, 2, pp. 69–72, 1956. [Japanese, with English summary. Abs. in *For. Abstr.*, 18, 1, p. 130, 1957.]

Cubes of sapwood 2 cm. square, of *Fagus crenata* [*F. sieboldii*: 33, p. 416], *Cryptomeria japonica*, and *Pinus densiflora* were subjected to decay tests by *Poria vaporaria* [33, p. 393] and *Polystictus versicolor* [32, p. 292 and next abstract]. The moisture content increased suddenly ten days after inoculation, and then remained static. The maximum weight loss for *Poria vaporaria* was reached in 20

to 30 days, and also for *Polystictus versicolor* on beech, though on the other test blocks it took two months.

Higuchi (T.), Kawamura (I.), & Hayashi (I.). **Biochemical study of wood-rotting fungi. V. The enzymatic oxidation of lignin.**—*J. Jap. Wood Res. Soc.*, 2, 1, pp. 31–35, 1956. [Japanese, with English summary. Abs. in *For. Abstr.*, 18, 1, p. 129, 1957.]

In this further contribution to the series [cf. 34, p. 119] the oxygen consumption of concentrated laccase solutions from Japan lac and *Lactarius piperatus* in the presence of lignins was compared with the effect of the culture filtrate of *Polystictus versicolor* [see preceding and next abstracts]. It was concluded that the attack of white rot fungi on beech [*Fagus sieboldii*] wood flour could not be due to lignin oxidation being catalysed by laccase in the culture filtrates. The oxidation of lignin by *Pseudomonas fluorescens* was inhibited by sodium azide, 8-hydroxyquinoline, and salicylaldoxime.

Kišpatić (J.). **Otpornost smeđe srži poljskog Jasena prema gljivama.** [The resistance of the brown heartwood of field Ash to fungi.]—*Šum. List*, 79, 11–12, pp. 587–603, 1955. [German summary. Abs. in *For. Abstr.*, 18, 1, p. 130, 1957.]

The sapwood and brown heartwood of ash (*Fraxinus angustifolia*) were inoculated with *Polyporus adustus*, *P. hispidus*, *Polystictus versicolor*, *Pholiota squarrosa*, *Coniophora cerebella* [*C. puteana*], and *Daldinia concentrica* in decay tests in Yugoslavia. The most rapid decay was caused by *Polystictus versicolor* [see preceding abstract] and the sapwood was more susceptible to fungal attack than the brown heartwood. The wood of trees without brown heartwood was less resistant than the sapwood of trees with brown heart.

Jurášek (L.). **Změny v mikrostruktuře zdřevnatělé buněčné blány při rozkladu dřevokaznými houbami.** [Changes in the microstructure of the lignified cell wall during attack by wood-decaying fungi.]—*Biológia* [*Czechoslovakia*], 10, 5, pp. 569–579, 1955. [Russian and German summaries. Abs. in *For. Abstr.*, 18, 1, p. 129, 1957.]

Histochemical investigations of spruce wood undergoing [unspecified] brown rot indicated that decay begins in the middle layer of the secondary wall, the inner layer is next attacked, followed by the compound middle lamella. In white rot induced in culture by *Panus stipticus* [cf. 34, p. 416] delignification begins in the inner layer of the secondary wall and spreads from the lumen to the primary wall, accompanied by cell wall swelling. Following the delignification of the secondary wall the cells become loosened by the decomposition of the middle lamella.

Burgess (H. J.). **Termination of an experiment on the durability of pressure-creosoted Keruing fence posts.**—*Malay. Forester*, 19, 3, p. 165, 1956.

Fence posts of keruing (*Dipterocarpus baudii*, *D. verrucosus*, and *D. sublamellatus*) treated with creosote plus diesel oil (1 : 1) to an average retention of 5½ lb. per cu. ft. and installed in Kuala Pilah, Malaya, had a service life of about 25 years. Deterioration was caused by [unspecified] fungal decay followed by termite attack. The first post fell after 16 years; none was unattacked after 24 years.

Reed (L. B.). **Insects and diseases of vegetables in the home garden.**—*Home Gdn. Bull.* 46, 48 pp., 4 col. pl., 47 figs., 1956.

This bulletin is revised from the previous edition [36, p. 152].

Larson (R. H.), Walker (J. C.), & Pound (G. S.). **YR Charleston Wakefield, a new yellows-resistant Cabbage variety.**—*Phytopathology*, 46, 11, pp. 623–624, 1 fig., 1956.

A description is given of the cabbage variety YR Charleston Wakefield, produced by the United States Department of Agriculture and the University of Wisconsin, Madison [34, p. 581], and released in 1954–5. It is resistant to yellows (*Fusarium oxysporium* f. *conglutinans*) [*F. conglutinans*: cf. 35, p. 649].

Hewitt (E. J.), Agarwala (S. C.), & Williams (A. H.). **Molybdenum as a plant nutrient. VIII. The effects of different molybdenum levels and nitrogen supplies on the nitrogen fractions in Cauliflower plants grown in sand culture.**—*J. hort. Sci.*, 32, 1, pp. 34–47, 4 graphs, 1956.

The authors report a study of various nitrogen fractions in molybdenum-deficient cauliflower plants which had received nitrogen in a number of forms. The symptoms in these plants were the subject of an earlier paper [35, p. 148]. They conclude that whiptail symptoms are not caused by deficiencies of adenine or of total α amino acid, organic, or protein nitrogen fractions. The possibility that the condition may be associated with the accumulation of a specific amino acid compound is held to merit further investigation.

Kole (A. P.) & Philipsen (P. J. J.). **Fysiologische specialisatie bij Plasmodiophora brassicae Woron.** [Physiological specialization of *Plasmodiophora brassicae* Woron.]—*Tijdschr. PlZiekt.*, 62, 6, pp. 261–265, 1 graph, 1956. [English summary.]

Results of inoculation studies at the Agricultural College, Wageningen, Netherlands, from 1954 to 1955, confirmed the existence of two races of *Plasmodiophora brassicae* [33, p. 697; 35, p. 136]. Turnip was heavily affected by *P. brassicae* originating from turnip and only slightly by that from cabbage, while cauliflower was heavily affected from both sources. Use of *P. brassicae* inocula from as many sources as possible is recommended in resistance breeding.

Bennett (C. W.). **Sugar Beet yellow vein disease.**—*Plant Dis. Reptr*, 40, 7, pp. 611–614, 1956.

A detailed description is given of sugar beet yellow vein disease [24, p. 136], graft transmissible and believed to be of virus origin, and probably present in the United States for many years before it was first noticed in literature in 1921 [1, p. 230]. The disease, characterized by yellowing of leaf veins, dwarfing of one side of the plant in early stages of infection, and stunting of the entire plant in the later stages, has been reported from Arizona, California, Colorado, Kansas, and New Mexico. Although the infected plants are damaged severely, incidence generally appears low.

Watson (Marion A.) & Russell (G. E.). **The value of glasshouse tests with seedlings in selecting plants tolerant to Beet yellows virus.**—*Ann. appl. Biol.*, 44, 3, pp. 381–389, 1 graph, 1956.

In attempts at Rothamsted Experimental Station to assess the sensitivity of sugar beet to beet yellows virus by symptom expression in the glasshouse and to correlate the results with the effects of the disease on yield in the field, commercial strains of sugar beet and breeders' lines of beet and *Beta vulgaris* subsp. *maritima* were exposed to infection with the Rothamsted standard stock of the virus (SBY) and the more severe strain (SBYN) [33, p. 407], varying numbers of *Myzus persicae* being used as vectors. Symptom severity was assessed by scoring for etch [36, p. 79]. All varieties of sugar beet tested were susceptible, but the

severity of the symptoms varied, particularly as between the cultivated and wild types.

The scores made in the glasshouse were positively correlated with similar scores made in a field experiment with two cultivated and two wild beet types. The symptom scores were also positively correlated with losses in root and sugar yields caused by the virus, but extrapolation from glasshouse to field results appeared to be more reliable for the *B. vulgaris* than the *B. maritima* types.

Russell (G. E.) & Trim (A. R.). **Effects of 8-azaguanine on Sugar Beet infected with Beet yellows virus.**—*Nature, Lond.*, 179, 4551, p. 151, 1 graph, 1957.

At the Plant Breeding Institute, Cambridge, treatment of sugar beet seedlings infected by beet yellows virus with 8-azaguanine [guanazolo] caused a delay of symptom appearance [30, p. 447; 34, p. 133]. Three types of sugar beet seedling were used and were inoculated at the two-leaf stage with *Myzus persicae* infected with a virulent strain of the virus. Symptoms accompanied by stunting and distortion appeared in treated plants three to four days (range, one to nine days) later than in the untreated. The compound (15 ml. of 0·01 M guanazolo in 0·1 per cent. sodium bicarbonate) was sprayed on the plants and watered on the soil at three-day intervals, two applications being given before inoculation. The results showed no indication of any relationship between tolerance of the virus, as exemplified by the three different beets, and the effect of guanazolo, nor was it certain whether it acted on the virus or on plant growth.

Gerola (F. M.) & Vaccari (E.). **Ricerche sul metabolismo glucidico in piante virosate di 'Spinacia oleracea'.** [Researches on the glucidic metabolism in virus-affected plants of '*Spinacia oleracea*'.]—*R. C. Ist. lombardo*, 88, 11, pp. 582–591, 1955. [Received December, 1956.]

In studies at the Institute of Botany, University of Milan, enzymatic and chemical determinations made on the leaves of spinach plants affected by a mosaic disease of virus origin [? cucumber mosaic virus] showed that the metabolic processes in them were more active than in healthy leaves, this activity being maintained and inhibiting or limiting the development of the other metabolic centres of the affected plants.

Bertini (S.). **Brevi notizie e qualche ricerca sulla biologia di Ascochyta pisi Libert.** [Brief notes and some researches on the biology of *Ascochyta pisi* Libert.]—*Ann. Sper. agr.*, N.S., 10, 3, pp. 957–981, 3 pl., 1 fig., 7 graphs, 1 map, 1956. [English summary.]

After distinguishing between the different types of lesions caused on peas by *Ascochyta pisi*, *Mycosphaerella pinodes*, and *A. pinodella*, respectively, and noting the geographical distribution of *A. pisi* [map 273], the author describes investigations carried out at the Institute of Plant Pathology and Agricultural Microbiology and the Regional Observatory of Phytopathology, Pisa, on the biology of *A. pisi*.

In a liquid medium sugars, including the pentoses, were the main source of carbon, though certain alcohols could be used. Nitrogen was obtained from nitrate and ammonia, but chiefly from amino acids. The fungus was auxo-autotrophic, but growth was favoured by the presence in the medium of biotin, colin, and calcium pantothenate, singly or combined. The best growth occurred at about 26° C. and pH 6. Pycnidia and pycnospores were largest on malt agar and smallest on broad bean stalks. The fungus excreted an antibiotic substance active against sporogenous, Gram-positive bacteria. Growth in culture was inhibited by a number of fungicides of recent formulation, seed treatment with which did not impair germinative capacity.

Smale (B. C.) & Worley (J. F.). **Evaluation of 2, 3, 5-triphenyl tetrazolium chloride for obtaining pathogenic types from stock cultures of halo blight and common blight organisms.**—*Plant Dis. Reptr*, 40, 7, p. 628, 1956.

At the Horticultural Crops Research Branch, Beltsville, Maryland, when serial dilutions of 12-month-old stock cultures of *Pseudomonas* [*medicaginis* f. sp.] *phaseolicola* were streaked on potato dextrose agar containing 0·005 per cent. tetrazolium and incubated at 28° C., colonies of comparable size developed, varying in colour from red, through various proportions of red and white, to entirely white [cf. 34, p. 438]. Colour was related to pathogenicity, the red colonies being highly pathogenic and the white ones weakly so to six-day-old plants of Black Valentine bean [*Phaseolus vulgaris*]. In similar experiments with *Xanthomonas phaseoli* differences developed in colour but not in pathogenicity.

Newly isolated cultures of both species were highly pathogenic, those of *X. phaseoli* causing severe infection within seven days as against 14 or more for bacteria from the original stock culture. On tetrazolium agar the recently isolated cultures of both species, as opposed to stock cultures, produced many entirely red colonies and practically no white ones.

De Zeeuw (D. J.), Guyer (G. E.), & Andersen (A. L.). **Fungicide and insecticide seed treatments on Peas and Beans, 1953–55.**—*Plant Dis. Reptr*, 40, 8, pp. 727–733, 1956.

In fungicidal tests in Michigan from 1953 to 1955 for the seed treatment of Round Pod Kidney Wax beans [*Phaseolus vulgaris*: 32, p. 658] and Alderman peas [32, p. 602] most materials containing captan, thiram, or dichlone were uniformly effective in improving stands, while mercury compounds were less consistent. An experimental material, ethyl B-856 (75 per cent. 1, 3-dichloro-5, 5-diphenyl hydantoin, Ethyl Corp., Pittsburg Coke), at 2 oz. per 100 lb. seed, was outstandingly effective on peas.

Yerkes (W. D.). **Chaetoseptoria wellmanii in Mexico.**—*Mycologia*, 48, 5, pp. 738–740, 2 figs., 1956.

During the summer of 1955, *Chaetoseptoria wellmanii* [33, p. 332] was observed, for the first time in Mexico, on beans (*Phaseolus vulgaris*) throughout the States of Mexico (below 7,500 feet), Puebla, and Hidalgo, and in parts of Michoacán and Querétaro. All types of Mexican beans were affected, those of the canario race most severely.

Cardona-Alvarez (C.) & Walker (J. C.). **Angular leaf spot of Bean.**—*Phytopathology*, 46, 11, pp. 610–615, 1 fig., 1956.

From 1951 to 1954 at Medellin, Colombia, interplanting susceptible beans (*Phaseolus vulgaris*) with a number of legumes resulted in infection by angular leaf spot (*Isariopsis griseola*) [36, p. 159] on lima bean (*P. lunatus*) only; soybean was not attacked [cf. 11, p. 89]. In the United States, the disease, though usually minor, is occasionally epidemic and instances of 50 per cent. loss were recorded in Wisconsin in 1954.

In culture at the University of Wisconsin, Madison, on potato dextrose agar with 1 per cent. bean leaf extract and on honey peptone agar growth occurred from 8° to 28° C. (optimum 24° at pH 5 to 6), but not at 36°, and spore germination at 8° to 32° (optimum 20° to 28°), but not at 36°. Infection is stomatal, intercellular at first, later intracellular with necrosis, and extending rapidly until restricted by the vascular bundles.

No evidence of seed or residual soil transmission was obtained, but the fungus survived two successive winters on infected plant debris, survival being mainly by means of stromata. Infection occurred from 16° to 28° (most rapid disease

development at 24°), but not at 32°. A period of three hours in a moist chamber at 24° sufficed for inoculated plants to develop infection. In one experiment exposures for 0, 3, 6, 9, 12, 15, and 24 hours resulted in averages of 1·6, 6·4, 9·5, 17·8, 65·5, and 130 lesions per plant. Periods in a moist chamber before inoculation did not aid infection. Coremial formation occurred only in a moist atmosphere, taking about 24 hours, but 72 hours or more were needed for heavy sporulation. Light for 12 hours resulted in more infection than for 4 or 16 hours, but varying light intensity had little effect.

Spore dispersal was favoured by low humidity. Splashing water from surface-inoculated soil caused high infection of both stem and leaves, while air currents carried infected soil particles a distance of 7 m. Airborne water was less effective, since wetted coremia released spores less readily. Moisture is the critical factor in epidemics.

Zaumeyer (W. J.) & Wester (R. E.). **Control of downy mildew of Lima Beans with streptomycin.**—*Plant Dis. Reptr*, 40, 9, pp. 776–780, 3 figs., 1956.

In greenhouse tests on early Thorogreen lima bean [*Phaseolus lunatus*] at Beltsville, Maryland, effective control of downy mildew (*Phytophthora phaseoli*) [35, p. 381] was obtained with agrimycin 100, agristrep, and phycomycin sprays at a concentration of 100 p.p.m. streptomycin. Plants were sprayed 24 hours before inoculation. Pure streptomycin sulphate was less effective. Agrimycin 500 containing 25 p.p.m. each of streptomycin and neutral copper gave far better results than copper A or agrimycin 100 at the same concentrations, the action being synergistic.

Baggett (J. R.). **The inheritance of resistance to strains of Bean yellow mosaic virus in the interspecific cross Phaseolus vulgaris × P. coccineus.**—*Plant Dis. Reptr*, 40, 8, pp. 702–707, 3 figs., 1956.

The results of inoculation studies at the Oregon State College, Corvallis, with two strains of bean yellow mosaic virus did not permit the exact interpretation of inheritance of resistance in the interspecific cross *Phaseolus vulgaris* (lines of the Blue Lake variety) × *P. coccineus* [cf. 34, p. 338]. The wide range of infection in the F_2 plants, however, indicated the effect of modifying genes, and the variable ratio of infected to uninfected plants in the three generations suggested the conditioning of inheritance of the resistance or immunity derived from *P. coccineus* by two or three major recessive gene pairs.

All the 223 *P. coccineus* plants grown near infected gladioli remained symptomless, although susceptible bean varieties were severely infected. It is concluded that this species shows promise of high resistance to many strains of bean yellow mosaic.

Stubbs (L. L.). **Motley virus disease of Carrot in California.**—*Plant Dis. Reptr*, 40, 9, pp. 763–764, 1956.

The motley dwarf virus disease of carrot, hitherto believed to occur only in Australia [33, p. 337], has been identified in California, constituting a new record for the United States. The disease was found in the San Joaquin Valley, at Davis, in the Salinas area, and in Ventura county. In all fields examined, particularly root crops, the population of the vector (*Cavariella aegopodii*) was low, even where no insecticides had been applied, and the virus appeared to spread far less rapidly than in Australia.

Kotthoff (P.). **Der Möhrenblattbrand.** [Carrot leaf blight.]—*Gesunde Pfl.*, 8, pp. 106–109, 1956. [Abs. in *Z. PflKrankh.*, 64, 2, p. 108, 1957.]

During July and August, 1955, extensive outbreaks of carrot leaf blight were observed in Westphalia. The frequently concatenate conidia of a species of *Alter-*

naria isolated on agar from diseased material measured 18 to 63 by 9 to 15 μ compared with 39 to 246 by 8 to 25 (mean 139 by 16) μ for those with long beaks collected on the foliage. Samples of seed kept since the preceding spring were found to be heavily infected by a small-spored form of the fungus which was killed by seed treatment.

Commenting on this information, the reviewer ([H.] Bremer) states that the disease was prevalent in various parts of Germany during the four years preceding the above-mentioned attacks. It was caused by the hitherto uncommon *A. porri* f.sp. *dauci* [*A. dauci*: 25, p. 581], accompanied in one case by a *Cercospora* close to *C. carotae* [32, p. 342]. The seeds are frequently parasitized by *Stemphylium radicinum*, while *A. tenuis* occurs as a saprophyte or facultative parasite on the leaves.

Moore (W. D.). **Powdery mildew of Pepper in Florida.**—*Plant Dis. Reptr*, 40, 8, p. 756, 1956.

The discovery of powdery mildew (*Erysiphe cichoracearum*) on [chilli] pepper near Boca Raton, Florida, in 1955, appears to constitute a new host record for the United States.

Bertini (S.). **Una infezione di ruggine su Cichorium endivia L. (Endivia scarola) e su C. intybus L. (Cicoria).** [A rust infection on *Cichorium endivia* L. ('Lettuce'-Endive) and on *C. intybus* L. (Chicory).]—*Ann. Sper. agr.*, N.S., 10, 3, pp. 1055–1062, 4 pl., 2 graphs, 1956. [English summary.]

In March, 1955, endive and chicory plants cultivated on a large scale in the plain round Pisa, Italy, were severely attacked by rust (*Puccinia cichorii*) [cf. 5, p. 275; 31, p. 225], though Trocadero lettuces growing in the immediate vicinity were unaffected. The species of *Puccinia* recorded on lettuce and chicory are tabulated, with notes on their spore characteristics.

Marlatt (R. B.) & Stewart (J. K.). **Pink rib of Head Lettuce.**—*Plant Dis. Reptr*, 40, 8, pp. 742–743, 1956.

A disorder of head lettuce, consisting of a diffuse pink discoloration of the main leaf ribs, and sometimes of the smaller veins, was observed in the field in Arizona from 1953 to 1955. The colour, which is due to bright red patches in or on the walls of parenchymatous cells, also develops in storage, but low storage temperatures (37° F.) delay the appearance of severe symptoms.

McKeen (C. D.). **A ringspot virus on greenhouse Cucumbers in Ontario.**—Abs. in *Phytopathology*, 47, 1, p. 23, 1957.

Symptoms (more pronounced on the leaves than on the fruit, and masked in hot weather) of a virus disease of the tobacco ring spot type have affected greenhouse cucumbers in Ontario since 1952 [cf. 35, p. 810]. Strains of tobacco ring spot virus [33, p. 705] have not, however, afforded protection against the former virus, which when inoculated into a number of hosts became completely systemic only in cucumber (in about 60 per cent. of the plants inoculated). Inoculation of cucumber cotyledons results in visible symptoms after some six weeks or more. The main concentration of the virus appears to be in the roots, through which infection may take place.

Zink (F. W.), Grogan (R. G.), & Welch (J. E.). **The effect of the percentage of seed transmission upon subsequent spread of Lettuce mosaic virus.**—*Phytopathology*, 46, 12, pp. 662–664, 1956.

Experiments in commercial lettuce fields in the Salinas Valley, California, in 1955 indicated that if the percentage of seed transmission of lettuce mosaic virus exceeds 0·1 the degree of control obtained will be unsatisfactory due to subsequent spread by vectors [32, p. 533; 35, p. 67].

VAN HOOF (H. A.). **Verschil in Reactie van wilde Sla ten opzichte van besmetting met het Slamozaiek-virus.** [Differences in reaction of wild Lettuces with regard to infection by Lettuce mosaic virus.]—*Tijdschr. PlZiekt.*, 62, 6, pp. 285–290, 2 figs., 1 map, 1956. [English summary.]

A number of wild lettuce varieties tested at the Experimental Station for Outdoor Vegetable Cultivation in Holland for susceptibility to lettuce mosaic virus all proved susceptible. The results obtained with *Lactuca serriola* have already been noticed from another source [35, p. 660]. The reaction of *L. virosa* was in all cases a necrosis, though seed from Cologne gave rise to less susceptible plants.

VAN HOOF (H. A.). **Virusziekte bij Rabarber.** [Virus disease of Rhubarb.]—*Meded. Proefsta. Groenteteelt Nederl.* 3, pp. 761–764, 4 figs., 1956. [English summary.]

No data being available on the yield reductions caused by rhubarb viroses [cf. 36, p. 4] in the Heemstkerk and Zwolle districts of the Netherlands, a small trial plot was laid down in the spring of 1955 using the Champagne Red variety. In the first year the diseased plants were not appreciably less productive than the healthy, but in 1956 the weight of the former (with moderately severe symptoms) was 23·6 per cent. less than that of the latter.

GAROFALO (F.). **Osservazioni sui semi di Melanzana infetti da Fusarium.** [Observations on Eggplant seeds infected by *Fusarium*.]—*Nuovo G. bot. ital.*, N.S., 62 (*1955*), 3–4, pp. 545–546, 1956. [Received March, 1957.]

In work conducted during 1954 at the Phytopathological Laboratory, University of Turin, Italy, the author isolated *Fusarium moniliforme* [*Gibberella fujikuroi*], *F. oxysporum*, and *F. scirpi* var. *caudatum* separately and together from the roots, stems, leaf petioles, and flesh of eggplants [cf. 18, p. 485, *et passim*]. When an attempt was made to germinate 400 seeds from infected plants under aseptic conditions, 40 per cent. became covered with *F. oxysporum* or *G. fujikuroi* in ten days or less and failed to germinate; 35 per cent. germinated and formed rootlets which became infected; and only 25 per cent. gave healthy plants. Many apparently normal seeds and those with a few brown spots bore the mycelium of *F. oxysporum*.

Twenty days after being put to germinate in Petri dishes only 35 per cent. of 300 naturally infected, untreated seeds had germinated and most of the others were mouldy; 85 per cent. of a similar batch treated with mercurigamma (20 gm. per kg.) had germinated vigorously and the remainder were not mouldy.

ATHOW (K. L.). **Studies of Soybean infection by the stem canker fungus.**—Abs. in *Phytopathology*, 47, 1, p. 2, 1957.

Observations on *Diaporthe phaseolorum* var. *caulivora* [35, p. 412] over eight years [? at Purdue University, Indiana] showed that stem lesions never appeared until soy-bean plants were 62 days old, regardless of the date of planting; in 31 of 40 plantings the incubation period was 70 to 80 days, though half the 28-day old and 85 per cent. of the 35-day-old artificially inoculated plants were infected. All natural infection is by the leaf blades, or at the junction of leaflets and petiole. Removal of the first six trifoliate leaves before plants were 58 days old stopped infection, which in adjacent plants eventually amounted to 36 per cent.

HERR (L. J.). **Factors affecting a root rot of Soybeans incited by Phytophthora cactorum.**—Abs. in *Phytopathology*, 47, 1, pp. 15–16, 1957.

The causal organism of root rot of soy-bean in north-western Ohio [35, p. 652] has been identified as *Phytophthora cactorum* [see next abstract]. In pot tests young plants were more susceptible than old, though as the period following soil inoculation increased, the difference was less.

KAUFMANN (M. J.) & GERDEMANN (J. W.). **Root and stem rot of Soybeans caused by a species of Phytophthora.**—Abs. in *Phytopathology*, 47, 1, p. 19, 1957.

Stem and root rot of soy-bean, characterized by a light brown canker advancing up the stem, and wilting [? in Illinois], is associated with a *Phytophthora* sp. closely related to *P. megasperma*, which proved highly pathogenic. In greenhouse tests, however, *P. megasperma* was not pathogenic nor were *P. cactorum* [cf. preceding abstract] or *P. cryptogea*. All plants of the varieties Hawkeye and Harosoy wound-inoculated with the *P.* sp. were killed, but Illini and Monroe were resistant and remained healthy. Resistance appears to be controlled by a single dominant gene.

GOODE (M. J.). **Physiologic specialization in Colletotrichum lagenarium.**—*Plant Dis. Reptr*, 40, 8, p. 741, 1 fig., 1956.

Severe anthracnose on Charleston Gray and Congo watermelons in eastern North Carolina in 1954 and 1955 was caused by *Colletotrichum lagenarium* [32, p. 298]. In inoculation tests isolates from the fruits were pathogenic to these two varieties and to Fairfax, while all three varieties were resistant to N.C.–1, representative of isolates usually obtained from susceptible varieties in the State. The existence of two or more physiologic races of the fungus is indicated.

GOODE (M. J.) & WINSTEAD (N. N.). **Variation in pathogenicity of Colletotrichum lagenarium.**—Abs. in *Phytopathology*, 47, 1, p. 13, 1957.

After outbreaks of anthracnose (*Colletotrichum lagenarium*) [35, p. 811] in 1954 and 1955 in North Carolina on watermelon varieties considered resistant to the disease isolates of the fungus from these and from susceptible cucurbits were used to inoculate seedlings and fruits of breeding varieties of cucumber, watermelon, and squash. By separating the isolates according to pathogenicity, it became apparent that there are three or more physiologic races of *C. lagenarium*.

WOOD (F. C.). **Diseases of cultivated Mushrooms.**—*Nature, Lond.*, 179, 4554, p. 328, 1957.

The author suggests that the name *Sporendonema purpurascens* (Bon.) Mason & Hughes n.comb. should be used for the fungus called red *Geotrichum* (*G. purpurascens*) [31, p. 589; 34, p. 205], which competes with mushroom spawn in compost beds. The fungus is being studied in the laboratory of W. Darlington and Sons, Ltd., Worthing, Sussex.

GOODMAN (R. N.). **Effects of organic fungicides and antifungal antibiotics on Mushroom mildew, Dactylium dendroides and lipstick mold, Geotrichum sp.**—*Plant Dis. Reptr*, 40, 8, pp. 714–717, 5 figs., 1956.

In fungicide tests at Hermann, Missouri, terraclor at 500 and 1,000 p.p.m., applied as a soil drench, proved highly effective against mildew (*Dactylium dendroides*) [*Hypomyces rosellus*: cf. 35, p. 71; 36, p. 163] in mushroom houses and did not damage the mushrooms. The effect of a single application lasted for six weeks. Dowicide A at similar concentrations inhibited the growth of *H. rosellus* for only ten days and the mushrooms had a brown discoloration. Terraclor was equally effective against *Geotrichum* sp. [cf. 31, p. 589].

BOVAY (E.). **La chlorose prématurée du vignoble.** [Untimely chlorosis of the vineyard.]—*Rev. rom. Agric.*, 12, 12, pp. 119–120, 1 fig., 1956.

In this brief note from the Federal Agricultural Experimental Station, Lausanne, the author reports that chlorosis of the vine caused by magnesium deficiency [cf. 33, p. 11] responded well to spraying with 0·5 per cent. magnesium sulphate or 1 per cent. magnesium oxide, even when followed by heavy rain. There is evidence

that heavy rains tend to leach magnesium from the soil but that its retention is improved by the presence of Bordeaux mixture.

HARVEY (J. M.). **Effects of frequency of sulphur dioxide fumigation during storage on decay and fumigation injury in Emperor Grapes.**—*Phytopathology*, 46, 12, pp. 690–694, 3 graphs, 1956.

In the light of 25 literature references experiments are described that were carried out from 1951 to 1953 by the United States Department of Agriculture at Fresno, California, on the effects of fumigating Emperor grapes with sulphur dioxide, initially at 1 per cent., and subsequently at intervals of 7, 14, or 21 days at 0·75 per cent. The fruit was held in boxes at 31° to 32° F., at a relative humidity of 85 to 90 per cent., and examined after three and five months. It was inoculated with spores of *Botrytis cinerea*, applied with the apparatus of Tervet *et al.* [30, p. 481]. No consistency was observed between frequency of fumigation and sulphur dioxide injury, though this appeared to increase with mechanical injury of the fruit and a high initial gas concentration (as occurred in 1952 when two 1 per cent. fumigations were given at the outset). Less frequent fumigation was associated with more decay over long storage periods, but over shorter periods the frequency had no significance. Late harvested grapes decayed more readily than those picked early [cf. 34, p. 831], so much so that there should be no delay in marketing. Length of storage period and amount of decay were positively correlated.

HANSEN (H. P.). **Correlations and interrelationships in viruses and in organisms. Classification and nomenclature of plant viruses.**—*K. VetHøjsk. Aarsskr., 1956*, pp. 108–137, 1956.

The author's proposals for a revised nomenclature of plant viruses, which are set out in detail, have already been noticed [35, p. 745].

BEST (R. J.). **Resistance of higher plants to viruses.**—*J. Aust. Inst. agric. Sci.*, 22, 3, pp. 174–179, 1 diag., 1956.

In this paper, presented at a symposium on 'The resistance of plants to pests and pathogens' held at the Waite Agricultural Research Institute, Adelaide, on 12th October, 1955, the author discusses the meaning of resistance by plants to virus attack; the life-cycle of a virus [cf. 34, p. 551; 35, p. 745]; vulnerable stages therein; inactivating substances [cf. 17, p. 141; 24, p. 326]; inhibitors [cf. 27, p. 508; 30, p. 98; 35, p. 344]; conditions affecting infection and multiplication [cf. 28, p. 207]; and the genetical approach to the subject. That plants contain substances which inactivate viruses and that most are gene-controlled [cf. 35, p. 148] appears to be certain, but the underlying chemical mechanisms are not yet fully known. A study of the causes of host specificity is probably the best approach to discovering the nature of host resistance. The specific configuration of the proteins at the site of absorption is one factor influencing host specificity, and the nucleic acid specificity of viruses may be another. Investigation of the chemical bases of these relationships is essential to the solution of the problem. A list of 31references is given, most of which have been noticed from time to time in this *Review*.

JEDLINSKI (H.). **Plant virus infection in relation to the interval between wounding and inoculation.**—*Phytopathology*, 46, 12, pp. 673–676, 3 graphs, 1956.

Studies were carried out at the University of Nebraska, Lincoln, on the relation between the susceptibility as measured by lesion counts of *Nicotiana glutinosa* [34, p. 110] and other plants to virus infection at varying intervals of time (up to ten min.) between abrasion and inoculation [cf. 36, p. 171]. The abraded leaves were dipped in the inoculum. The susceptibility of *N. glutinosa* and the Java Isere×

Cabot variety of tobacco to tobacco mosaic virus decreased rapidly within the first minute. In *N. rustica* it decreased in the first 30 secs. and then increased, this increase being more marked with tobacco necrosis virus. With the necrosis virus and cowpea susceptibility increased for five mins. and then decreased, while with cowpea and tobacco ring spot virus it increased for five mins. and then remained unaltered for an equal period. Susceptibility of *Phaseolus vulgaris* to ring spot increased slowly but regularly for 10 mins., but with the necrosis virus the length of time involved had little effect on this host or on the tobacco variety.

The results obtained do not support the idea of infection resulting simply from the introduction of virus particles into wounded cells, but favour an adsorption theory, involving a possible part played by unwounded cells, as outlined for animal and bacterial viruses by Puck and Sagik (*J. exp. Med.*, 97, pp. 807–820, 1953).

VAUGHAN (E. K.). **A device for the rapid removal of tannins from virus infected plant tissues before extraction of inoculum.**—*Tijdschr. PlZiekt.*, 62, 6, pp. 266–270, 1956. [Dutch summary.]

The author describes, with tabulated results, his studies at the Phytopathologica Institute, Wageningen, the Netherlands, on the use of the Soxhlet apparatus, with various features modified as described, to remove the tannins and enable the extraction of certain plant viruses to be carried out with maintenance of their infectivity [cf. 32, p. 135].

MATSUI (C.). **Electron microscopic studies on bacterial virus active against Pseudomonas solanacearum E. F. Smith. II.**—*Sci. Bull. Fac. Agric. Kyushu*, 15, 3, pp. 333–338, 2 pl., 1955. [Japanese, with English summary. Received 1956.]

At Kyushu University, Japan, the spherical bodies, about 50 mμ in diameter, obtained from a suspension of lysed *Pseudomonas solanacearum* (strain B-19) [34, p. 768] under the action of bacterial virus strain A (S_1) by differential centrifugation at 26,000 and 57,000 *g*, both for one hour, and 20,000 *g* for two hours, were shown by investigation of their viral activity and by one step growth experiments to be virus particles.

BRIERLEY (P.). **Susceptibility of Gomphrena to Tomato ringspot virus.**—*Plant Dis. Reptr*, 40, 7, p. 667, 1956.

At Beltsville, Maryland, *Gomphrena globosa*, used as an index plant for detection of hydrangea viruses, was found to be susceptible to tomato ringspot virus [cf. 34, p. 455]. Six to ten days after inoculation it developed solid, grey leaf spots which became bordered with red in another five to six days. Tip killing sometimes occurred after 28 days. The virus, not previously recorded on this host, was transmitted from *Gomphrena* to *Gomphrena* and tobacco, but not from tobacco, tomato, or antirrhinum to *Gomphrena*. It is readily distinguished from hydrangea ringspot virus by its capacity to invade *Gomphrena* systemically and to infect tobacco.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, 4, 12, pp. 190–191, 1956.

An official notice in *El Caribe* of 28th April, 1956, provides that importers into the Dominican Republic of plant stocks and materials must obtain a permit from the Secretary of Agriculture prior to the entry of such materials, in accordance with Decree No. 1287 of 24th May, 1935 [16, p. 144].

The Customs Proclamation published in the *Jamaica Gaz. Suppl*, 78, 34, 1955, (an amendment to that of 1949 [29, p. 176]) prohibits the importation into Jamaica of unprocessed plant parts, plant materials, soil, or any substance likely to contain these materials except under certain specified conditions.

Proclamation No. 93 (Union of South Africa) 1956, published in the *Govt Gaz.*, 184, 5683, 1956, provides for restrictions on the introduction of certain plants and

for the application of certain provisions to plants from areas outside the Union, except Bechuanaland, Swaziland, and Basutoland.

List of intercepted plant pests, 1955.—*S.R.A., Bur. Ent., Wash.*, 63 pp., 1956. [Received January, 1957.]

Interceptions from air-borne material entering United States Territory between 1st July, 1954, and 30th June, 1955 [cf. 35, p. 544], included *Cercospora kalmiae* on mountain laurel [*Kalmia latifolia*] leaves from England and the Netherlands; a number of fungi intercepted on orchids [35, p. 679]; *Puccinia pelargonii-zonalis*, believed to be a new introduction, on horseshoe geranium [*Pelargonium zonale*] from Hawaii; and *Phakopsora jatrophicola* on nettle spurge [*Jatropha* sp.] from Guadeloupe.

Xanthomonas citri was intercepted 104 times both on air-borne material and in cargo of various species of citrus from China, Japan (83 times), the Philippines, India, and New Guinea. Cancrosis B (*X.* sp.) [33, p. 522], a disease with symptoms resembling those of canker, was intercepted three times on lemon and once on orange from Argentina and once on lemon from Brazil. Of 84 interceptions of *Elsinoe australis* on various kinds of citrus, 62 were from Brazil and 18 from Argentina.

Neovossia indica [map 173], not known to occur in the United States, was detected on wheat in mail from Afghanistan.

Follin (C.). **'Växtkarantänsproblemet'.** [The plant quarantine problem.]—*Växtskyddsnotiser, Stockh., 1956*, 5–6, pp. 75–80, 1956.

This is a commentary on a recent German article on plant quarantine work at the port of Hamburg [35, p. 866], drawing attention to analogies and contrasts between Federal Germany and Sweden [35, p. 544], e.g., in the balance of trade in plant products and the organization of the plant inspection service.

McKay (R.), Loughnane (J. B.), & Kavanagh (T.). **Plant diseases in Ireland in 1954 and 1955.**—*J. Dep. Agric. Eire*, 52, pp. 10–14, 1955–56.

In 1954, infection of wheat by yellow rust (*Puccinia glumarum*) [cf. 36, p. 175] attained unprecedented proportions on the farm at Glasnevin, Dublin. The disease was observed on 10th March on the Glasnevin Rosa variety, previously considered resistant, and later affected the whole collection of about 27 varieties and numerous hybrids. Eyespot (*Cercosporella herpotrichoides*) [35, p. 520] has become a problem in the Republic of Ireland wherever cereals are cultivated continuously. In preliminary experiments carried out on a sèverely infected crop of winter wheat in 1954, spraying with 15 and 20 per cent. sulphuric acid in late March and early April delayed the attack and reduced lodging. Incidence of black leg of sugar-beet caused by *Phoma betae* greatly decreased as a result of seed treatment with ethyl mercury phosphate [33, p. 587; 34, p. 692; 35, p. 873, *et passim*].

Stations fédérales d'essais agricoles, Lausanne. Rapport d'activité 1955. [Report for 1955 on the work of the Federal Agricultural Experiment Stations, Lausanne.]—*Annu. agric. Suisse*, (70), N.S., 5, 5, pp. 399–513, 10 figs., 3 graphs, 1956.

The following are among the numerous items of phytopathological interest in sections 2 and 6 of this report [cf. 35, p. 274]. *Puccinia graminis* attacking spring wheat crops of the Lichti variety caused up to 60 per cent. of the grain yield to be unfit for milling. Observations on a crop of oats revealed the presence of Liro's two forms, 'hard' and 'soft' smut, of *Ustilago avenae* [17, p. 842].

Eight applications between 29th April and 18th June of 0·2 per cent. Geigy ultra-sulphur resulted in effective control of mildew (*Erysiphe graminis*) on Kenia barley, increasing grain and straw yields by 10·1 and 19 per cent., respectively.

The season was exceptionally favourable for outbreaks of potato blight (*Phytophthora infestans*), the primary foci of which developed simultaneously on 6th June on Eersteling [Duke of York] at Vouvry, Valais, and on Bintje at Lausanne-Bellerive. Towards the 16th the disease assumed an epiphytotic form in the Rhone Valley and by about ten days later the whole of French Switzerland was involved, a climax being reached in mid-July. At least six fungicidal treatments are necessary for protection.

Information is presented on the relative efficiency of Beaumont's [16, p. 514 *et passim*] and Hyre's methods of forecasting potato blight epiphytotics [35, p. 318], and the modifications necessary for their use under Swiss conditions are indicated.

Mass infection by *Rhizoctonia* [*Corticium*] *solani*, involving losses of up to half the crop, was stimulated by the spring drought and cold weather at the end of March and in mid-April.

Selected lines of potato growing in heavily limed soil in Valais were severely attacked by *Actinomyces scabies*.

Stem-grafting tests with viruses X (Jubel strain) and A (Boehms Allerfrüheste Gelbe) to determine the reactions in the field of 18 potato varieties revealed hypersensitivity to the latter [34, p. 746] in Panther, Vedette, Augusta, Adelheid, Benedikta, Ackersegen, Ebstorf 47/4, Ebstorf 48/50, and Bintje. All the others were susceptible to virus A, while virus X failed to evoke hypersensitivity in any.

Colza stands sustained considerable pod damage from *Alternaria brassicae*. The introduction of tobacco varieties (Jaune R and Burley R) resistant to the nematode —*Thielaviopsis* [*basicola*] complex [34, p. 211] almost entirely eliminated the root rot due to this cause.

The first symptoms of vine downy mildew (*Plasmopara viticola*) appeared in three localities of Valais on 28th and 29th May and at Pully (Lausanne) on 7th June. On 23rd August the incidence of infection on untreated grapes in an experimental vineyard was 83 per cent. Effective control was secured by the application of captan (0·25 per cent. before and 0·5 after flowering), cuprosan (0·5) and Bordeaux mixture (2) after flowering, cuprosan (0·5 and 0·5), and mesulphan (a product with a base of methane-sulphenyl-trichloromethyl-parachloroaniline containing 50 per cent. of the active ingredient) [36, p. 254].

Uncinula necator was observed for the first time at Pully on 8th July, and some perithecia were collected on 8th October. The best control was given by Bordeaux mixture (1·5 per cent. before and 2 after flowering), copper oxychloride (0·75 and 1), copper oxide (0·4 and 0·4), mesulphan suspension (0·15 and 0·25), and paste (0·2 and 0·2).

Apple and pear scab (*Venturia inaequalis* and *V. pirina*) were virulent in French Switzerland and Ticino. Although the perithecia began to mature on 10th April [cf. 36, p. 898], the first ascospore flights were delayed until the May rains. Massive flights were registered during two critical periods with temperatures exceeding 10° C. and more than 10 mm. precipitation between 10th and 17th May. The first foliar lesions appeared on 12th May in Valais and between the 22nd and 31st around Lac Léman and on the plateau. Secondary infections were promoted by the very wet summer, and late scab was severe in unsprayed orchards. It was found that synthetic organic products, notably zineb (0·2 per cent.), captan (0·25), and mesulphan (0·2), were effective substitutes for sulphur in the post-blossom treatment of apple scab. All the trees were sprayed before flowering; on 26th April with 1 per cent. lime-sulphur plus 0·2 per cent. copper oxychloride, and on 6th May with 0·75 per cent. wettable sulphur and 0·1 per cent. copper oxychloride.

Plum rust (*Tranzschelia* [*Puccinia*] *pruni-spinosae*) occurred in a rather severe form on the plateau, doing considerable damage.

Peaches round Lac Léman were badly injured by *Taphrina deformans*, while the pathogenicity of *Megalocladosporium* [*Fusicladium*] *carpophilum* in Ticino was again

disquieting. Captan (0·5 per cent.), thiram (1), and wettable sulphur (0·5) proved superior to lime-sulphur (0·5) in the control of the latter pathogen.

Tomatoes all over French Switzerland were attacked by *Phytophthora infestans*, especially near infected potato fields. A list is given of a number of other well-known pathogens on kitchen-garden crops.

Tomatoes in Valais and Ticino are liable to heavy infection by tobacco mosaic virus, early attacks of which may cause yield reductions of up to 40 per cent., while cucumber mosaic virus has been found on the same host in the latter canton. Potato viruses X and Y are also not infrequent on tomato.

Plane [*Platanus*] trees around Lac Léman were heavily infected by *Gnomonia veneta*.

The symptoms of a bacteriosis of carnations in a market garden at Nyon (Vaud) agreed with those reported for *Pseudomonas caryophylli* [cf. 35, p. 188].

A species of *Pestalotia*, probably *P. guepini*, caused a die-back of *Phylica ericoides* at Ascona, Ticino.

The range of beet yellows virus was extended during the period under review but damage was generally confined within tolerable limits, the proportion of infected plants in the Rhone and Orbe Valleys and the Lac Léman basin rarely exceeding 20 per cent. at the end of the season. In certain localities, however, such as the environs of Lausanne and of Wavre and Mavin (Neuchâtel), percentages of 90 and 100 were finally recorded. In the latter region the sugar beet fields are near market gardens growing table beets and spinach.

A premature reddening of apple (especially Golden Delicious) leaves, transmissible by grafting, has been observed, frequently in association with chat fruit [30, p. 325]. Rough skin virus [34, p. 374] occurs in several parts of French Switzerland on the Boskoop, Golden Delicious, Canada Pippin, and Cloche varieties.

Several cases of stony pit of pears have been notified on the Beurré Clairgeau and Beurré Bosc varieties, making the latter fruit unmarketable. Fondante Thirriot appears to be resistant.

A necrotic strain of potato virus Y caused important losses of tobacco in the Magadino plain and the Mendrisiotto (Ticino) and also in the Broye Valley.

Onion mosaic (Allium virus 1) [yellow dwarf virus: map 46] was responsible for serious depredations among seed crops, in one of which the incidence of infection reached 100 per cent. and the yield reduction was estimated at 70 per cent.

Bean (*Phaseolus* [*vulgaris*]) mosaic virus [map 213] was very prevalent on susceptible varieties. Fernasan at a dosage of 230 gm. per 100 kg. seed or 0·92 gm. per sq. m. soil gave the best control of damping-off (*C. solani*) [cf. 31, p. 247 *et passim*].

For the first time *Myzus ornatus* was detected in outdoor strawberry crops in May and June. It is a vector (though a less efficient one than *Pentatrichopus fragaefolii*) of strawberry virus 1 [mottle virus: 35, p. 904].

Olson (L.). **Något om skadedjur och växtsjukdomar på lantbruksgrödor i Skåne-Halland 1956.** [Something about pests and plant diseases of agricultural crops in Scania-Halland 1956.]—*Växtskyddsnotiser, Stockh., 1956*, 5–6, pp. 80–85, 4 figs., 1956.

A contributory factor to the severity of *Erysiphe graminis* on wheat and barley in the Scania-Halland region of Sweden [35, p. 175] during the spring of 1956 was undoubtedly the frequency of cereal cultivation in succession to rape which had been heavily fertilized with stable manure. There was sometimes a connexion between susceptibility and potassium deficiency.

Manganese deficiency was exceptionally widespread, especially in oats [cf. below, p. 387] and beet, while potato and rape were also affected. Copper deficiency was observed in various cereals, while boron shortage was responsible for heart rot of beet [24, p. 249].

Sooty moulds, e.g., *Alternaria* and *Cladosporium* spp., occurred in profusion on spring wheat infested by aphids. Late-maturing wheat varieties were heavily damaged by *Puccinia graminis* in an area between Trelleborg and Skurup, while *Cercosporella herpotrichoides* was an important cause of lodging in parts of Malmöhus. *Rhizoctonia* [*Corticium*] *solani* was particularly virulent on early potato varieties.

Seventh Annual Report of the Commonwealth Scientific and Industrial Research Organization for the year ending 30th June, 1955.—Canberra, 185 pp., 1955. [Received October, 1956.]

In the section of this report from Australia [cf. 35, p. 161] dealing with microbiology (pp. 24–25) it is stated that a water-soluble substance has been extracted from resistant potato varieties which inhibits the release of zoospores of *Phytophthora infestans*.

Streptomycin systemically absorbed by plants accumulates in the tissues, some of it exuding in droplets on the leaf surface and reducing the severity of attacks by *P. infestans* on potato and tomato and *Peronospora tabacina* on tobacco.

The resistance of *Nicotiana debneyi* to *P. tabacina* was of the suprasensitive type. The release of spores from the conidiophores took place when the atmospheric humidity attained 100 per cent. and then fell.

Varietal differences in susceptibility of stone fruit to brown rot (*Sclerotinia fructicola*) were attributed to properties of the epidermis. Only minute amounts of gaseous sulphur released from sulphur fungicides were necessary to inhibit powdery mildew [*Erysiphe polygoni*] of subterranean clover, whereas clover rust [*Uromyces trifolii*: 34, p. 726], *S. fructicola*, and *Phytophthora infestans* were unaffected.

In the tobacco investigations section (pp. 26–27) it is noted that susceptibility to *Peronospora tabacina* in the field may be influenced by environment. In further studies on tobacco frenching the disease was not induced by heavy watering of infected plants which had been cut back. Frenching developed more rapidly in tobacco following other crops than tobacco in a greenhouse experiment. The frenching factor was concentrated by centrifuging soil filtrates and by chemical flocculation. Soil treatment with a vanadium compound sometimes prevented it.

Tobacco leaf curl virus [map 147], first found in Western Australia in 1953, has now been detected in the Northern Territory.

Annual Report of the Department of Agriculture (Central), Federation of Nigeria, for the year 1953–54. Part II.—52 pp., 1956.

In the section of this report [cf. 35, p. 164] dealing with plant pathology (pp. 36–41) C. A. Thorold states that Panama disease of bananas (*Fusarium oxysporum* var. [f.] *cubense*) is serious in the southern Cameroons [35, p. 906], being prevalent in the Tiko plain and along the west coast. *Trachysphaera fructigena* [loc. cit.] is a major pathogen in the etiology of cigar-end disease [associated with *Verticillium theobromae*]. Other pathogens recorded on banana in the southern Cameroons include *Armillaria mellea* and *Sclerotium rolfsii*.

The cost of spraying cacao against black pod (*Phytophthora palmivora*) [35, p. 753] at Aponmu over an area of 40 acres was reduced from £17. 1*s*. in 1952–3 to £8. 7*s*. in 1953–4 by spraying at intervals of six weeks instead of three. Incidence was kept at 6 per cent. in both seasons by this programme. From observations in Ondo Province it is recommended that spraying should begin in April rather than in May.

Damage to cotton by *Xanthomonas malvacearum* [35, p. 165] was more severe where growth was poor due to poor soil, waterlogging, and delayed weeding. Seed disinfection would appear to be economic at a cost of 1*s*. per acre.

A variety of groundnut, Mwitunde [35, p. 661], resistant to rosette virus has been introduced from East Africa. *Sphacelotheca sorghi* [35, p. 165] caused extensive damage in some fields of sorghum at Samaru and demonstrations of control by seed treatment with copper carbonate were given. Young plants were frequently attacked by *Gloeocercospora sorghi* in July. In some late-maturing plots of *Pennisetum typhoides* attack by *Sphacelia* sp. [cf. 34, p. 295] was very heavy.

Sugar-cane red rot (*Colletotrichum falcatum*) [*Glomerella tucumanensis*] continued to spread in the northern region and is present in all cane-growing areas except Sokoto West and Benue Province. Damage caused by the disease, however, was less than in previous years. Young tomato plants in the northern region were heavily infected by *Septoria lycopersici* during May.

A disease of yam (*Dioscorea* sp.) of unknown etiology was observed in a fertilizer trial; symptoms included stunting and distortion of the leaves in severe cases, while the leaves of less seriously affected plants were mottled along the veins.

Among the results obtained by the maize rust research unit it is reported that above 4,000 ft. *Puccinia polysora* [35, p. 418 and following abstracts] is replaced by *P. sorghi*. The rate of spread of *P. polysora* declines as the rainy season progresses. The optimum temperature for the germination of uredospores is 27° C. compared with 17° for *P. sorghi*.

Botany and Plant Pathology.—*Rep. Minist. Agric. Rhod. Nyasald 1955–6*, pp. 66–70, 1956.

In this report [cf. 35, p. 508] new host and disease records noted include *Diplodia macrospora* [map 227], causing leaf spot and ear rot, and *Sclerospora sorghi* [map 179] on maize, *Septoria nodosum* [*S. nodorum*: map 283] on wheat, *Cladosporium cladosporioides* f. sp. *pisicola* and *Peronospora viciae* on garden peas, *Pseudoperonospora cubensis* [map 285] on cucumber and sweet melon, and red clover anthracnose caused by *Colletotrichum trifolii*.

Tobacco anthracnose (*C. tabacum*) [35, p. 241] spread rapidly during the season, but zineb sprays gave good control. Wildfire [*Pseudomonas tabacum*] was prevalent, and incidence of angular leaf spot [*P. angulata*: 35, p. 333] was the highest for many years. Tobacco seedlings were frequently affected by a leaf spot ascribed to nitrogen-phosphorus unbalance.

For the third successive year a severe epiphytotic of potato blight (*Phytophthora infestans*) [35, p. 509] developed in the summer crop, particularly near Salisbury. Race (1, 4) was encountered on Kennebec. Blackleg (*Erwinia atroseptica*) occurred on some irrigated crops; in one planting losses reached 20 per cent. Two plantings of the Pentland Ace variety were affected by *Spongospora subterranea*.

The most serious disease of maize, leaf blight (*Helminthosporium turcicum*) [34, p. 707], was favoured by wet weather conditions and caused severe losses. *Puccinia polysora* [cf. preceding and next abstracts] appeared a month earlier than usual; promising resistance was shown by Mexican 16 and crosses between inbreds and resistant lines from Nyasaland with resistant lines from Kenya. Premature wilting and lodging of maize on waterlogged soil was associated with *Fusarium graminearum*.

Phytophthora drechsleri on velvet bean [*Mucuna deeringiana*: 35, p. 92] has spread; it was shown that the fungus persists in the soil for at least two years.

Between 10 and 20 per cent. of French bean [*Phaseolus vulgaris*] crops at Umtali were lost through attacks by *Elsinoe* (?) *phaseoli* [cf. loc. cit.] and *Colletotrichum lindemuthianum*. Low-veld tomato crops were affected by *Cladosporium fulvum* after a lapse of three years. Black rot (*Pseudomonas* [*Xanthomonas*] *campestris*) was severe on cauliflowers and cabbages grown under irrigation. *Glomerella cingulata* was responsible for serious losses from bitter rot in apple orchards.

A die-back of azaleas [*Rhododendron*] was due to a species of *Phomopsis*.

In field trials satisfactory control of stem break (*Colletotrichum curvatum*) of sunn hemp [*Crotalaria juncea*: 35, p. 504] was achieved by seed treatment with thiram at 8 oz. per 200 lb. The development of the disease was delayed in plots receiving heavy applications of phosphate.

Report of the Tanganyika Agricultural Corporation for the period 1st April to 30th September, 1955.—83 pp., 1956. 4*s*.

In the plant pathology section (pp. 16–17) of this report [formerly the Report of the Overseas Food Corporation: 36, p. 232] it is noted that groundnuts are more resistant to *Cercospora* spp. [*Mycosphaerella arachidicola* and *M. berkeleyii*: loc. cit.] if they have fewer stomata (per unit area) above the minimum size penetrable by spore germ-tubes.

Further observations on the wilt of groundnuts have failed to establish a causal agent; the possibility of virus infection is being investigated.

Appreciable losses were suffered by the maize crop from infection by *Puccinia polysora* [see preceding abstracts], although incidence was not especially high during the year.

Deighton (F. C.). **Plant pathology section.**—*Rep. Dep. Agric. S. Leone, 1954*, pp. 27–28, 1956.

Records in this report [cf. 35, p. 165; 36, p. 7] include *Cephalosporium eichorniae*, found for the first time on ramie (*Boehmeria nivea*) and *Croton dispar*, and a leaf spot of zinnia, probably caused by *Xanthomonas nigromaculans* f. *zinniae*, all at Njala. A brown angular leaf spot associated with bacteria was common on groundnuts at Njala just before harvest. A leaf spot of seedling oil palms at Njala and Newton was caused by *Cercospora elaeidis* [cf. 36, p. 100].

Leaf break of rice, associated with *Neottiospora* sp., was fairly common at Masimo on India pa lil 46 and Ngasein. The early varieties D.114, B.G.79, and D.99 were practically free from attack. *Ustilaginoidea virens* was found only on Ngasein 57.

Ovulariopsis papayae on papaw was recorded for the first time in Sierra Leone at Murray Town in January, 1955.

Allan (W.). **Annual Report of the Department of Agriculture, Cyprus, for the year 1955.**—30 pp., 1956.

In this report [cf. 35, p. 509] it is noted (pp. 24–25) that the only varieties of broad beans resistant to root rot (caused mainly by *Fusarium oxysporum* [f. *pisi*: 35, p. 340]) were found to be unsatisfactory agronomically.

The Extension Service (pp. 26–27) reported that the spring potato crop was again severely attacked by blight (*Phytophthora infestans*). An outbreak of *Plasmopara viticola* on vine was arrested by subsequent dry weather; radio warnings were issued to growers to commence spraying.

Goodban (J. W. D.). **Annual Report of the Agricultural Department, British Honduras, for the year 1955.**—55 pp., [? 1956].

In this report [cf. 34, p. 84] it is stated that a few citrus trees in British Honduras died during 1955 from an undetermined form of gummosis; losses were not serious. Spraying against banana leaf spot (*Cercospora*) [*Mycosphaerella musicola*: loc. cit.] was started on a new plantation in the Stann Creek district in which Panama disease [*Fusarium oxysporum* f. *cubense*: 29, p. 12; 34, pp. 43, 466] also appeared. Red Kidney beans [*Phaseolus vulgaris*] were affected by rust [*Uromyces appendiculatus*: map 290], anthracnose [*Colletotrichum lindemuthianum*: map 177], and other [unspecified] fungal diseases, especially when grown for more than two years on the same land; some farmers are using sulphur dusts with success.

GAUDY (M. R.). **Contribution des techniciens scientifiques au développement de l'agriculture en Afrique Occidentale Française.** [Contribution of science technicians to the development of agriculture in French West Africa.]—*J.W. Afr. Sci. Ass.*, **2**, 2, pp. 172–197, 1956.

This paper includes phytopathological notes on some tropical crops in French West Africa. Protective control of *Cercospora* spp. [*Mycosphaerella arachidicola* and *M. berkeleyii*; **34**, p. 345] on groundnuts by dusting with a sulphur-copper mixture gave significant increases in yield, fungicidal seed-treatment [cf. **33**, p. 334] increasing stands by 15 to 26 per cent.

Spread of tracheomycosis of coffee (*Fusarium* [*Gibberella*] *xylarioides*) [**35**, p. 182] was slowed down with carbolineum and copper oxychloride. Grafting on to [*Coffea*] *robusta*, which has allowed the cultivation of the Kouilou and Indénié varieties [**35**, p. 606], better adapted than *C. robusta* to certain regions, is also being tried. *Hemileia vastatrix* [loc. cit.] was controlled by burning and burying, cutting out, and manuring, chemical treatment being impracticable. A collar rot of coffee causing losses in nurseries can be controlled by soil disinfection with formalin before sowing, followed by fungicidal treatment with cryptonol, ceresan, and zineb.

Cercospora [*Mycosphaerella musicola*: **34**, p. 773] causes severe damage to bananas, particularly in Guinea; 'false mosaic' [*Hormodendron* sp.: **34**, p. 656] is less destructive.

Trunk canker of cacao caused by a *Phytophthora* sp. has presented an important danger in the last few years.

Congrès de la protection des végétaux et de leurs produits sous les climats chauds. [Congress on the protection of plants and their products in hot climates.]—543 pp., 12 pl., 54 figs., 1 diag., 24 graphs, 1 map, Marseille, Institut Français d'Outre-Mer, 1954. [Received March, 1957.]

Much of the information presented in these papers on plant diseases and plant protection, read at this Congress held from 21st to 24th September in Marseilles, has already been noticed in this *Review*. Part 2, Section 2 (pp. 141–239) deals with parasitic and physiological diseases. In the absence of A. MALLAMAIRE, his general review of the subject (pp. 141–146) was prepared and presented by R. GUY. D. RUI (pp. 147–153) described research on non-parasitic leptonecrosis of peach trees [**35**, p. 465] and (pp. 153–154) olive trees [**36**, p. 256] in Italy.

P. FREZAL (pp. 155–159) discussed some virus and virus-like diseases of citrus in North Africa [**34**, p. 640; **36**, p. 184]. A. MALLAMAIRE (pp. 160–171) listed the chief fungal, bacterial, and virus diseases, and parasitic phanerogams attacking cultivated plants in French West Africa and French Togoland. The same author also reviewed the phytosanitary situation in French West Africa in 1953 (pp. 172–174). J. LAURENT (pp. 175–177) discussed the phytosanitary situation in the Lake Tchad region. M. FERRAND (pp. 178–179) dealt with mineral deficiencies in relation to plant health in tropical Africa. A. MALLAMAIRE (pp. 180–183) gave an account of maize rust (*Puccinia polysora*) [**35**, p. 11] in French West Africa and French Togoland. J. GRIMALDI (p. 184) described the teleutospores of *P. polysora* from two specimens of the rust collected in the French Cameroons. J. MAISTRE (pp. 185–187) gave details of experiments in progress to determine the threshold of boron deficiency in groundnuts. L. SAUGER and M. CATHERINET (pp. 188–189) gave a short account of the resistance of groundnuts in the Ivory Coast to rosette virus disease [**36**, p. 163] and described the course of the disease. M. MEIFFREN (pp. 190–192) gave an account of the methods used to control tracheomycosis of coffee (*Gibberella xylarioides*) in the Ivory Coast [see preceding abstract] and J. GRY (pp. 193–195) dealt with the distribution of the different foci of infection in the Ivory Coast and the incidence of the disease. R. DROUILLON (pp. 196–197) presented an account of the diseases and pests of the coffee trees in Ubangui-Chari as

in June, 1954. A. M. Saccas (pp. 198–201) gave the results of research work on coffee tracheomycosis in Ubangui-Chari from 1949 to 1954 [35, p. 522].

J. Grimaldi (pp. 202–205) dealt with cacao black pod (*Phytophthora palmivora*) [34, p. 86] and foot rot (*Armillariella* [*Armillaria*] *mellea*) [loc. cit.] in the French Cameroons, and (pp. 207–208) with die-back of the same host locally, caused by capsid injury in association with *Calonectria rigidiuscula* [loc. cit.].

M. Sechet (p. 209) presented a note on the biological characters of *Clitocybe tabescens* [34, pp. 107, 451]. J. Brun (p. 210) discussed fungal diseases of bananas in the coastal regions of French West Africa, including *Cercospora* [*Mycosphaerella musicola*: see preceding abstract], false mosaic [*Hormodendron* sp., loc. cit.], fruit rot (*Trachysphaera fructigena*) [35, p. 906], and stalk rot, caused chiefly by *Gloeosporium fructigenum* [*Glomerella cingulata*]. P. Muller (pp. 211–226) presented a full account of studies on the fruit rot of bananas in the French Cameroons caused by *Stachylidium* [*Verticillium*] *theobromae* and *Trachysphaeria fructigena* [see above, p. 379].

M. Lavabre (pp. 227–229) dealt with a condition affecting coco-nut palms growing in the vicinity of Kribi, French Cameroons, showing itself at first as a yellowing and wilting of the foliage. Two distinct diseases were found to be involved: a heart rot caused by an [unspecified] bacterium, frequently developing after injury by the insect *Oryctes erebus*; and a wilt due to infestation by *Aspiodotus destructor*.

H. Barat (pp. 230–231) presented a note on Fiji virus disease of sugar-cane in Madagascar [35, p. 720]. D. d'Emmerez de Chermoy (pp. 232–233) dealt with the control of sugar-cane diseases in Réunion. H. Stehle and F. Genly (p. 234) presented a short report on crown gall (*Phytomonas* [*Agrobacterium*] *tumefaciens*) of yams in Guadeloupe. F. Bugnicourt (pp. 235–239) gave a list of the parasitic fungi of cultivated plants in New Caledonia [cf. 33, p. 615].

Section 3 of Part 2 (pp. 241–270) contains papers on pesticides and fungicides. N. H. J. Villeneuve (pp. 262–265) discussed, with examples, the use of zineb against diseases of tropical crops. G. Flach (pp. 266–270) reviewed recent work on the control of plant diseases in the tropics by the use of copper dusts.

In Part 3, Section 4, Sub-section 1 (pp. 273–307) deals with spraying and dusting machines. J. Delasnerie and J. Lhoste (pp. 273–275) discussed different types of apparatus. K. Gallwitz (pp. 276–279) described studies conducted in Germany on the deposition of the particles of antiparasitic 'fogs'. M. Labrousse and [J.] Jauffret (pp. 281–287) discussed different types of spraying and dusting apparatus suitable for use in tropical areas. J. Cuillé and H. Guillot (pp. 288–291) presented the results of studies on the spraying of bananas with 'light fogs' of oil mixtures [36, p. 40], suitable for use against *M. musicola* in the French Antilles and against this disease and false mosaic in French West Africa. P. Bevengut (pp. 292–293) discussed the high-pressure atomization of fungicides and the advantages of this method of application. G. Verluys (pp. 294–295) reviewed the economic advantages of fungicidal treatments effected by pneumatic sprays. H. Goodchaux (pp. 303–304) outlined nebulization by thermo-aerosol, a method of applying fungicides based on the vaporization of oil in a current of hot air. Plissier (pp. 305–306) described different types of micron sprayers [cf. 33, p. 254]. The Société A.M.A.C. (p. 307) contributed an account of the 'swingfog' apparatus [36, p. 40] for nebulizing a given product by projecting a cold liquid into hot air in a state of violent movement.

Sub-section 2 (pp. 309–330) comprises the papers dealing with seed treatment. J. Guillemat (pp. 309–312) analysed the results obtained overseas by seed treatments of groundnuts, cotton, and sorghum (the last in Tchad against *Sphacelotheca sorghi* and *S. cruenta*) with various fungicides. The Chamber of Commerce, Mostaganem, gave (pp. 312–313) brief directions for the seed treatment of cereals against smuts [*Ustilago* spp.] by chemical disinfection and heat. M. Ferrand (pp. 314–316)

discussed the effects of chemical treatment on the germinability and yield of groundnut seed [30, p. 212]. A. M. Saccas (pp. 319–324) presented the results of comparative tests carried out at the Central Station, Boukoko, French Equatorial Africa, with wet and dry seed treatments against sorghum smuts (*S. sorghi*, *S. cruenta*, and *Sorosporium reilianum* [*Sphacelotheca reiliana*], and covered smut of millet (*Tolyposporium penicillariae*) [34, p. 294]. R. Lagière (pp. 325–330) described tests conducted in Ubangui-Chari on the fungicidal dusting and storage of cotton seed [35, p. 607].

Sub-section 3 (pp. 332–334) contains one paper, a general report by R. Luziau on the control of diseases of tropical food-crops. Sub-section 4 (pp. 336–358) consists of papers dealing with the control of diseases affecting tropical fruits. J. Cuillé (pp. 336–339) gave a general review covering citrus fruits [cf. 34, p. 642], bananas [36, p. 40], and pineapples [cf. 34, p. 734] and (pp. 340–342) reviewed recent improvements in the control of citrus moulds (*Penicillium digitatum* and *P. italicum*). W. Martin (p. 343) contributed a note on the control by means of borax, boracic acid, and pentabor [34, p. 642] of *P.* spp. [*P. digitatum* and *P. italicum*] on citrus fruits exported from Algeria and Morocco. E. Walle and J. Couture (pp. 344–346) described tests on the control of *P.* spp. on citrus fruits by means of thiourea [loc. cit.]. C. Moreau (pp. 347–348) described preliminary studies on the control of *P. digitatum* and *P. italicum* (and also the less important *Alternaria citri*, *Phomopsis* [*Diaporthe*] *citri*, *Phytophthora parasitica*, and *Diplodia natalensis*) on stored citrus fruits in France by means of the albotenes LBT 10 S and MGBT, composed of organic derivatives of boric acid [36, p. 98]. G. Merny (pp. 351–352) gave a brief account of the control of *M. musicola* on bananas in the French Antilles [34, p. 659; 36, p. 40].

Sub-section 5 (pp. 360–373) deals with textile plants. R. Lagière (pp. 368–369) discussed the control of *Fusarium* wilt of cotton (*F. vasinfectum* var. *gossypii*) [*F. vasinfectum*] in Ubangui-Chari [cf. 33, p. 602], and (pp. 370–371) that of bacterial wilt (*Xanthomonas malvacearum*) in the same region [cf. loc. cit.].

In Sub-section 6 (pp. 375–439) there are papers on cacao, coffee, and tobacco crops. R. Guy (pp. 375–380) gave a general report on the control of their diseases. P. Jaubert (pp. 386–387) described experiments in Senegal on the control of leaf spot of groundnuts (*Cercospora personata*) [*M. berkleyii*: 34, p. 345], best achieved there by improved cultural methods. J. Gry (pp. 388–392) described the work of the mobile spraying and dusting unit in combating plant diseases in the Ivory Coast in 1953. A. M. Saccas (pp. 401–404) gave an account of experiments at the Central Station, Boukoko, French Equatorial Africa, on the control of the rots of cacao pods caused by *P. palmivora*, *Botryodiplodia theobromae*, and *Trachysphaera fructigena* [34, pp. 86, 354].

R. Renaud (pp. 409–411) discussed the possibility of controlling cacao swollen shoot virus disease in the Ivory Coast [34, p. 87]. A. M. Saccas (pp. 419–422[6]) described the work carried out in Ubangui-Chari on the control of tracheomycosis of coffee [see above, p. 382, and 35, p. 522]. In a note on this subject (p. 422[6]) from the Phytopathological Laboratory, Agricultural Research Centre, Bingerville, brief, practical directions are given for carrying out control in the field [loc. cit.].

Section 8 (pp. 503–540) covers regional and international problems. G. Bouriquet and H. Barat (pp. 529–530) discussed the danger of introducing new diseases into Madagascar and the precautions to be taken, including suitable quarantine measures [cf. 35, p. 720].

Tešić (Ž. P.). **Jedan predlog za klasifikaciju fitopatogenih bakterija.** [A suggestion for the classification of phytopathogenic bacteria.]—*Zasht. Bilja* (*Plant Prot., Beograd*), *1956*, 36, pp. 49–52, 1956. [French summary.]

The author reviews the existing systems of classification of bacteria and pro-

poses a new system, based on that of Krasil'nikov [35, p. 594] of classifying phytopathogenic species into six genera.

Annual Report of the West African Cocoa Research Institute, 1955–56.—90 pp., 1 pl., 1 map, 1957.

The virus section of this report (pp. 28–38) [cf. 35, p. 360] refers to laboratory tests by W. T. Dale and A. Attafuah in which a further eight species of indigenous and exotic plants were experimentally infected with cacao virus and 42 others proved insusceptible. Of 16 specimens of baobab (*Adansonia digitata*) in Ghana found to be infected, only one occurred near cacao. All present isolates from baobabs have produced symptoms in cacao resembling those of the Alaparun (Nigeria) and Kpeve (Togoland) strains of swollen shoot virus. It is thus possible that outbreaks of these strains in cacao originated in the baobab, just as the Western Province viruses have apparently originated from *Cola chlamydantha* [cf. 35, p. 168]. A more intensive survey of baobabs in Togoland is therefore envisaged. In a search for infections of a number of potential wild hosts virus (of the New Juaben type) was detected in young growth from a trunk of *Ceiba pentandra* in a cacao swollen shoot area. Possibly, undetected infection in mature forest trees is common but is of no danger to cacao unless new coppice growth is initiated.

Further insect transmission studies by W. T. Dale included a comparison of the efficiency of nymphs and young adult mealybugs (*Pseudococcus njalensis*) as vectors of the New Juaben strain, earlier results having equated 10 adults with 30 nymphs. Six infected nymphs produced a higher percentage rate of infection in cacao seedlings in the first flush than did two young adults (95 to 75), and using seedlings in the second or third flush, 15 nymphs produced 61 per cent. infection compared with 26 by five adults.

In an investigation by A. Attafuah and W. T. Dale of the possibilities of 'mild strain protection' [cf. 35, p. 594], 36 'protected' plants, inoculated as dissected beans with a mild strain of the New Juaben complex, and 36 controls were inoculated by single mealybugs at monthly intervals with virulent virus. After one year 27 controls and two 'protected' plants showed symptoms of virulent infection. 'Back-testing' transmission studies with mealybugs, however, revealed masked virulent infection in a further seven 'protected' plants, which is a strong argument against this method of control. Protection tests have afforded no further positive evidence of close relationship between isolates from widely separated virus outbreaks.

Observations on symptom sequences in batches of Amelonado seedlings infected with 16 cacao virus isolates from Nigeria and the Gold Coast have shown marked differences in virulence as assessed by leaf counts, leaf area measurements, and height [cf. 27, p. 178]. Concise description of symptom differences is often difficult.

Attempts by E. Margaret Holden to transmit cacao virus to cacao seedlings by abrasion with infected leaf extracts were uniformly unsuccessful, as also was Yarwood's method [33, p. 203] in infecting cacao and tobacco seedlings with New Juaben and Kpeve cacao viruses. In studies by the same author on the chemical detection of virus infection [cf. 33, p. 592] paper partition chromatography, applied to the separation of the tannin components of cacao leaf extracts, has shown that a detectable leucoanthocyanin present is related to the total tannin content, but the latter, though increasing with the presence of virus, may rise for other reasons, and is not a reliable guide to infection. In other investigations no obvious difference was observed between the anthoxanthins of healthy and virus-infected leaves. A colour test based on the reduction of 2, 3, 5-triphenyl tetrazolium chloride [35, p. 583] gave erratic results and is clearly not suited for cacao.

Following further studies of resistance and tolerance W. T. Dale reports that of 394 T17 (Iquitos-type) beans, derived from hand pollinations and inoculated

with New Juaben virus by exposing each to 40 infectious mealybug nymphs, 119 (30 per cent.) grew into symptomless seedlings from which the virus could not be recovered. However, in a second colonization of each uninfected plant with 200 vectors, none escaped infection. The plants were classified on the basis of tolerance, for which there was obvious genetical segregation. The ratings, ranging from 0 (marked symptoms) to 4, are tabulated, only plants in categories 2, 3, and 4 having been retained. Rooted cuttings were then taken from 50 trees of the F_1 parent of these and tested for resistance in five replicates, using 50 nymphs of *P. njalensis* per plant as vectors. In the first replicate 16 out of 250 cuttings failed to become infected. It is too early for the results to be classified, but there is a suggestion that tolerance and resistance may segregate together.

In the section on black pod disease (*Phytophthora palmivora*) (pp. 42–48) A. L. Wharton reports further trials of perenox, carbide Bordeaux, and normal Bordeaux mixture, carried out at monthly, bi-monthly, and 'frequent' intervals, the last indicating weekly or fortnightly spraying at the mid crop period and monthly spraying before and after that.

In contrast with the results for the previous season copper sprays, even at monthly intervals, considerably reduced the amount of disease. Summarizing the results to date of trials of fungicides and of various harvesting intervals he concludes that weekly harvesting increases yields by reducing loss from black pod, quite apart from any influence on the total number of pods borne [cf. 35, p. 753]. The best control is achieved by weekly harvesting combined with spraying, but this would be economic only for higher-yielding trees subject to heavy loss. However, the control achieved by an effective spray such as carbide Bordeaux is such that the need to harvest frequently is greatly lessened. Only carbide Bordeaux and perenox are held to merit further attention, the former for its effectiveness and persistence, and the latter for its reasonable performance and ease of preparation. Shade reduction also reduced black pod losses considerably.

To find out what proportion of proximal black pod infections originated from mycelium present in the cushions [35, p. 361] pods were painted weekly with perenox paste to ensure that any proximal infection which did develop originated from the cushion. The results indicate that this type of infection had accounted for 3 to 4·5 per cent. of total pods, i.e., 9 to 12 per cent. of black pods and 13 to 18 per cent. of proximal infections. Although these infections are few, those occurring early in the season may be important in initiating epidemics.

Reporting from the Ibadan sub-station [Nigeria] (pp. 80–87) R. M. Lister and J. M. Thresh state that a visit to the southern Bakundu and other forest reserves near cacao-growing regions in the British Cameroons showed *Cola chlamydantha* not to occur there, and apparently to have been confused with *C. lepidota*, *C. pachycarpa*, and *C. rostrata*. No virus symptoms were seen on these trees, and in a small number of tests with mealybugs no infection was transmitted from them to cacao. The distribution of baobabs in the Western Region [Nigeria] has been studied, and transmission trials have failed to reveal virus infection in those tested, but this investigation is to be extended.

Data obtained at Koroboto and Offa Igbo suggest that the reduction of cacao yields by virus depends on the length of time since contracting infection, but this needs confirmation. Observations on double-stemmed cacao plants indicated movement of virus 10 cm. from the point of inoculation within 24 hours. Growth of virus-infected cacao seedlings at 38° C. for up to four weeks did not eliminate the virus.

Observations were made on the effects of coppicing cacao trees in a belt 30 yds. from a tree showing symptoms. Although the appearance of symptoms may be delayed, indications are that spread around an initial outbreak is relatively small; the 30 yds. belt might be reduced, but it is to be retained for the present.

Thrower (L. B.). **The root diseases of Cacao in Papua and New Guinea.**—*Papua & N. Guinea agric. J.*, 10, 1, pp. 1–14, 18 figs., 1955. [Received February, 1957.]

This is a popular, illustrated account of the root diseases of cacao in Papua and New Guinea, and their control, which have already been noticed [35, p. 359].

Colwell (R. N.). **Determining the prevalence of certain cereal crop diseases by means of aerial photography.**—*Hilgardia*, 26, 5, pp. 223–286, 40 figs. (14½ col.), 10 graphs, 1956.

The results of the experiments sponsored by the National Research Council's Committee on Plant and Crop Ecology, and carried out in naturally infected fields and in test plots at the University of California, Davis, indicate that it is possible to identify healthy wheat, oats, barley, and rye and to recognize wheat and oats infected by *Puccinia graminis* and oats by [barley] yellow dwarf virus in aerial photographs. Frequent ground checks are advisable to verify the interpretations.

On the basis of measurements of spectral reflexion four film filter combinations were selected as the most promising in providing unique tone or colour characteristics for the various crops and diseases to be identified. Infra-red photography on a small scale is valuable in that it permits all light-toned (healthy) grain fields to be excluded from more detailed study. Large-scale, colour photographs may frequently be used with considerable accuracy for the estimation of disease severity and subsequent yield reduction.

Wahlin (B.). **Sjukdomar och skadedjur på stråsäd i nordöstra Götaland 1956.** [Diseases and pests of cereals in north-east Götaland 1956.]—*Växtskyddsnotiser, Stockh., 1956*, 5–6, pp. 65–71, 1 fig., 1956.

Fungous diseases of cereals, including *Fusarium nivale* [*Calonectria nivalis*], *Ophiobolus graminis*, *Cercosporella herpotrichoides*, and *Erysiphe graminis*, were generally unimportant in north-east Götaland, Sweden [cf. 33, p. 343], in 1956. *Puccinia graminis* was virtually limited to late crops of oats and *P. coronata* was also rare on the same host. Manganese deficiency was observed in oats and barley stands.

Niemann (E.). **Taxonomie und Keimungsphysiologie der Tilletia-Arten von Getreide und Wildgräsern.** [Taxonomy and germination physiology of the *Tilletia* species of cereals and wild grasses.]—*Phytopath. Z.*, 28, 2, pp. 113–166, 8 figs., 9 graphs, 1 map, 1956.

The information contained in this copiously amplified, fully documented study is partly covered by previous contributions to the same series [36, p. 236]. In addition to Gassner's Turkish material, the author examined smutted wheat, rye, and grass ears from Germany, Austria, Switzerland, Yugoslavia, France, the Caucasus, and Canada, a total of 168 samples from 107 sources.

Spore dimensions, thickness of the wall, and size or number of reticula on the spore surface, which were not influenced by passage through another host, proved to be suitable morphological characters for the differentiation of the various forms under observation. On the basis of spore dimensions they fell into two groups, (*a*) large-spored, represented by *Tilletia bornmuelleri* on *Elymus caput-medusae*, *T. pancicii* on barley [12, p. 559; 27, p. 11 and below, p. 392], *T. guyotiana* [see below, p. 393] on *Bromus* sp., *T. decipiens* on *Agrostis vulgaris* [cf. 25, p. 26], and *T. controversa* on *Agropyron desertorum*; and (*b*) small-spored, comprising *T. foetida* on wheat, recognizable by its smooth spores and characteristic areolate development of the membrane, and *T. lolii* on *Lolium linicola* [cf. 16, p. 564], with comparatively small reticula and yellow-coloured spore dust. The form of *T. caries* from wheat germinating at 15° C. and *T. hordei* from *Hordeum murinum* differed from the other collections studied in the thinness of the spore membrane (only 1·5 μ).

The collections from *A. repens*, *A. intermedium*, *A. cristatum*, *A. sibiricum*, *H. bulbosum*, and rye, and dwarf bunt of wheat (*T. controversa*), which germinated only at 3°, all resembled each other closely and can at most be assigned to a collective species, *T. secalis sensu auct.* To the same group would appear to belong the form from *Aegilops umbellata*.

Among the samples investigated, those from *Agropyron* spp. (except *A. desertorum*) and more especially the form from *H. bulbosum* are considered to approximate most closely to wheat dwarf bunt and rye bunt. The forms from *H. bulbosum* and *H. murinum*, hitherto united under the name of *T. hordei*, are distinct species, as shown by the well-marked differences in their spore shape.

Leukel (R. W.) & Earhart (R. W.). **Seed-treatment tests on winter Oats and Wheat in 1955–6.**—*Plant Dis. Reptr*, 40, 9, pp. 785–787, 1956.

In the 1955–6 seed-treatment trials [cf. 35, p. 442] natural infection of Fultex oats by *Ustilago avenae* and to some extent by *U. kolleri* was eliminated at Beltsville, Maryland, and Clemson, South Carolina, by MEMA, ceresan S (both 0·25 oz. per bush.), panogen, ceresan 244, ceresan D, metasol M, metasol E (all 0·75 oz.), ceresan 365 (0·5), YF–2576 (0·15), and panogen PA–2N (4), all liquids, and by slurry treatment with metasan M and E (both 0·5) and ceresan M–2X, infection of plants from untreated seed ranging from 12 to 18·2 per cent. Panogen PA–2N reduced emergence.

Similar treatments were applied to Purplestraw wheat seed artificially infected by *Tilletia caries* and *T. foetida*. At Clemson, where plants from untreated seed were 51·5 per cent. infected, bunt was eliminated by MEMA, panogen, ceresan 244, 365, D, and M-2X, metasan M, YF-2576, agrox (slurry, 0·5 oz.), and merculine (liquid, 0·25).

Graham (S. O.). **Germination responses of Ustilago tritici (Pers.) Rostr. teliospores in relation to lyophilization. I. Some factors affecting mortality before and after sublimation.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 307–317, 1956.

In experiments at the Washington Agricultural Experiment Stations, using a lyophile apparatus similar to that of Raper and Alexander (*Mycologia*, 37, pp. 499–525, 1945) the germinability of dry teleutospores of *Ustilago tritici* was affected very little by either quick freezing or lyophilization, while that of spores in suspensions was reduced by quick freezing, both alone and when followed by lyophilization. It is concluded that pre-sublimation quick freezing in the lyophile process is both superfluous and detrimental to these spores. Marked increases in germination occurred when lyophilized samples were conditioned for 24 hours in a water-saturated atmosphere prior to planting-out.

Gibler (J. W.). **'Enanismo', a virus disease of cereals in southern Colombia.**—Abs. in *Phytopathology*, 47, 1, p. 13, 1957.

An unidentified virus disease (called 'enanismo') on cereals in the Nariño department of Colombia and in northern Ecuador causes symptoms varying from slight stunting to rosetting and suppression of spikes. Grain is often shrivelled or small. Control can be achieved by planting to avoid the season of maximum leafhopper incidence, at which time otherwise tolerant varieties may succumb. Introduced barleys are highly susceptible, but native selections are nearly immune, and this resistance is readily transmissible. The wheat varieties Ciento Cinquenta, Thatcher, and many Colombian hybrids are tolerant.

McKinney (H. H.). **Interference and synergy—their possible use in identifying certain mosaic viruses of cereals and indicating degrees of relationship.**—*Plant Dis. Reptr*, 40, 10, pp. 898–903, 1 fig., 1956.

In further greenhouse experiments at Beltsville, Maryland [cf. 36, p. 238], the

establishment in Rescue wheat plants of a very mild strain of wheat streak mosaic virus [36, p. 16] completely blocked systemic infection by a virulent or yellowing strain of the same virus inoculated nine days later, indicating a close relationship between the strains.

Synergistic reactions occurred when wheat plants were inoculated with the viruses of wheat streak mosaic, barley stripe mosaic, and brome mosaic, combined in pairs. Plants with dual infections were more stunted, headed later or failed to head, and developed more severe chlorosis compared with those inoculated with only one virus. The value of synergistic reactions in differentiating viruses above the strain level is indicated.

SLYKHUIS (J. T.). **Wheat spot mosaic, caused by a mite-transmitted virus associated with Wheat streak mosaic.**—*Phytopathology*, 46, 12, pp. 682–687, 3 figs., 1956.

Investigations at the Science Service Laboratory, Lethbridge, Alberta, Canada, showed that the symptoms of chlorosis and stunting [34, p. 588] accompanying wheat streak mosaic virus [35, p. 879] are caused by wheat spot mosaic virus, which was transmitted by *Aceria tulipae*, but not mechanically. Test plants of the variety Kharkov 22 MC were used; certain of these, showing symptoms resembling severe wheat streak mosaic, but from which this virus could not be transmitted mechanically, were judged to contain wheat spot mosaic only. This was transmitted by *A. tulipae* at all stages, except the egg, to several wheat species, barley, *Setaria italica* and two wild *S.* spp., maize, and *Eragrostis cilianensis*. Certain wheat × *Agropyron* hybrids, immune from wheat streak mosaic, proved mildy susceptible to wheat spot mosaic.

HILU (H. M.). **Inoculation, life cycle and host–parasite relationship of Septoria tritici Rob. on Triticum species.**—*Diss. Abstr.*, 16, 9, p. 1550, 1956.

In studies on speckled leaf blotch (*Septoria tritici*) of wheat at the University of Illinois absorbent cotton proved suitable for inoculation purposes when a few plants were being treated, but for larger numbers water-soaking the leaves with a spore suspension by a pressurized atomizer is recommended. Satisfactory infection was obtained in this way without the use of a moist chamber. The results of many tests indicated that the pathogen infects the host only above ground level. The incubation period, which was longer at lower temperatures, ranged from seven to 16 days, averaging nine. The fungus survives the summer as pycnidia in volunteer wheat plants or in the leaves and leaf sheaths lying on the soil surface. Pycnospores produce the disease in early autumn, and secondary cycles are repeated as long as favourable conditions prevail. In winter the pathogen ceases growth but remains viable in the infected plants. Early spring infection either starts from spores from pycnidia or is a continuation of a secondary autumnal cycle.

Under greenhouse conditions all varieties of common wheat were susceptible, while those of *Triticum durum* ranged from susceptible to resistant (characterized by lower percentage of leaf infection and smaller number of lesions) [cf. 33, p. 220]. Direct penetration of the host epidermis was unusual, the fungus normally entering through the stomata. Without exception the hyphae grew intercellularly in all directions, branching irregularly and being limited only by the bundle sheaths. Sub-epidermal pycnidia of the symphogenous type, developing in the sub-stomatal chambers, were larger in the susceptible than in the intermediate or resistant varieties. The fungus could penetrate susceptible and resistant leaves alike, but usually failed to develop in the latter. Slow growth in the intermediate and resistant varieties resulted in a longer incubation period. Of a number of cereals and grasses inoculated in greenhouse tests only *Triticum* species developed infection.

Shu (P.), Neish (A. C.), & Ledingham (G. A.). **Utilization of added substrates by uredospores of Wheat stem rust.**—*Canad. J. Microbiol.*, 2, 6, pp. 559–563, 1956.

In an investigation of the nutrition of resting uredospores of wheat stem rust [*Puccinia graminis*: 33, p. 662] at the Prairie Regional Laboratory, Saskatoon, by supplying various compounds labelled with C^{14}, D-mannose, D-mannitol, D-glucose, sucrose, and D-fructose were utilized better than other carbohydrates. Of the amino acids, glutamic acid gave the highest yield of carbon dioxide, while L-arginine and L-lysine were more efficiently incorporated into the spore material.

Leathers (C. R.). **The behaviour of uredospores of Puccinia graminis var. tritici on the leaf surface.**—Abs. in *Phytopathology*, 47, 1, p. 22, 1957.

Fresh uredospores of *Puccinia graminis* on wheat leaves at 75° F. and 40 per cent. relative humidity maintained a high level of germination for several weeks. Germination of hydrated spores (previously maintained in a saturated atmosphere for 24 hours) on leaves subsequently exposed to dew remained between 70 and 90 per cent. for a 40-day period, whereas that of non-hydrated spores fell below 50 per cent. after three weeks and steadily decreased. Germination of uredospores subjected to several hours dew below 45° in the field, or to 30° to 70° in the absence of dew, remained near the maximum for three days.

Sharp (E. L.) & Emge (R. P.). **A 'tissue transplant' technique for obtaining abundant sporulation of races of Puccinia graminis var. tritici occurring on resistant varieties.**—Abs. in *Phytopathology*, 47, 1, p. 31, 1957.

By stripping back the lower epidermis of a healthy wheat leaf, placing a piece of mesophyll from a resistant variety infected with *Puccinia graminis* so that the two mesophylls adjoin, and putting back the healthy epidermis, it has been possible to obtain sporulation of the transplanted rust after seven days.

Mohamed (H. A. R.). **Comparative studies of races 49 and 139 of Puccinia graminis var. tritici Erikss. and Henn.**—*Diss. Abstr.*, 16, 6, pp. 1035–1036, 1956.

In studies at Minnesota University, the Marquis and Kota wheat varieties, at 60° to 72° F., were susceptible to race 49 of *Puccinia graminis* var. *tritici* [*P. graminis*] and resistant to race 139; over 80° the two could not be differentiated. No better differential than Marquis and Kota was found, though the Pilot, Ceres, and L.D. 53 durum wheats were as good.

At 80° to 85° Minturki was resistant to race 49A, but susceptible to race 49B; at 65°, Selkirk was susceptible to 49A, but less so to 49B. Three sub-races were demonstrated within race 139; Kentana 52 was resistant to 139A and susceptible to 139B; Rushmore was resistant to groups A and B, but susceptible to the third group (C+D), which could be further differentiated on Timstein or Lee, both resistant to 139C and susceptible to 139D at 72° to 90°. Infection centres were most numerous on the leaf surfaces of seedlings kept for 24 hours in moist chambers at 66° to 80°. The temperature at which seedling reaction changed from resistance to susceptibility was specific for each variety–rust isolate combination. The lethal temperature for the mycelium of the isolates was near 97°, though race 139A survived for five days at 105° in seedlings of Kota, Lerma 52, and Marquis. The uredospores of race 139B survived for ten days on dry foliage of Marquis and Little Club seedlings in the greenhouse at high midsummer temperature and light. At 72° no visible infection appeared on Lerma 52 inoculated with race 139A, but rust mycelium survived for at least 19 days and sporulated two to three days after the plants had been transferred to 85°. Lerma 52 was resistant to race 139A when the pre-inoculation temperature was 70° and the post-inoculation 74°, but it was less so when these temperatures were 85° and 74°, respectively.

Potočanac (J.) & Kišpatić (J.). **Otpornost domaćih i nekih stranih sorata Pšenice prema crnoj rđi.** [Resistance of domestic and some foreign varieties of Wheat to black rust.]—*Zasht. Bilja (Plant Prot., Beograd,) 1956*, 36, pp. 3–16, 1 diag., 1956. [English summary.]

Puccinia glumarum [cf. 35, p. 757], *P. graminis* [34, p. 355; 36, p. 6], and *P. triticina* [35, p. 94], all occur on wheat in Croatia, Yugoslavia. In plot trials, carried out from 1949 to 1952 at the Experimental Farm Botinec, near Zagreb, none of the domestic varieties tested were resistant to *P. graminis*. Of the American spring varieties, Regent, Thatcher, New Thatcher, Hope, and H-44 were completely resistant when grown in the autumn, but not in the spring. Regent alone showed no spring infection over a two-year period. Since these varieties are not adapted to the local climatic conditions they cannot be recommended for general cultivation, but may be of value in breeding.

Kendrick (E. L.), Metzger (R. J.), & Rhode (C. R.). **A possible new source of high resistance to Wheat smut.**—Abs. in *Phytopathology*, 47, 1, p. 19, 1957.

In screening wheat varieties for resistance to bunt (*Tilletia* spp.) [at Pullman, Washington] a variety P.I. 178383, believed to be endemic to Turkey, proved completely resistant to all the 27 known races of *Tilletia* spp. This variety is probably not a product of a breeding programme and may form a new source of high resistance [36, p. 181].

Purdy (L. H.). **Regional seed treatment tests for the control of seed-borne and soil-borne common smut of winter Wheat in the Pacific Northwest for the year 1956.**—*Plant Dis. Reptr*, 40, 11, pp. 996–1000, 1956.

Twenty-six seed treatments were tested for control of bunt (*Tilletia caries* and *T. foetida*) on Rio and Orin wheat at six locations in the Pacific Northwest States in 1956 [cf. 35, p. 599]. All the materials, including phenyl mercurials, were successful against seed-borne bunt, but infection in artificially infected soil was effectively controlled only by products containing HCB and PCNB. Combined seed- and soil-borne infection was reduced from 73·36 per cent. (untreated) to 4·4 or less by slurry treatment with sanocide, no bunt, captan HCB 40–40, anticarie, terraclor, and dow HCB (all at 1 and 2 oz. per bush.), and Chipman 80 per cent. HCB and Cal. spray 80 per cent. HCB (both $\frac{1}{2}$ and 1).

Purdy (L. H.). **The nature and extent of mercury injury and associated anatomical responses in Wheat seedlings.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 343–347, 4 pl., 1956.

In trials carried out jointly by the United States Department of Agriculture and the Agricultural Experiment Stations of Idaho, Oregon, and Washington seed treatment of Brevor, Omar, Rio, and Red Bobs wheat with ceresan M against *Tilletia caries* and *T. foetida* reduced germination and altered seedling growth, the effect ranging from mildly arrested development to hypertrophy of the roots and coleoptile [cf. 35, p. 599]. Injury was greater at the highest rate of application (2 oz. per bush.) than at 1 oz.; at $\frac{1}{2}$ oz. germination was not reduced and the seedlings were larger than those from untreated seed.

Holton (C. S.), Kendrick (E. L.), & Meiners (J. P.). **A possible explanation for the cyclic occurrence of dwarf bunt of winter Wheat in the Pacific Northwest.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 387–392, 1956.

The cyclic occurrence of dwarf bunt (*Tilletia controversa*) of winter wheat [see following abstract] in the Pacific Northwest is believed to be related to deep ploughing. When infected stubble is ploughed under, the environment deep in the soil is unfavourable for spore germination [cf. 36, p. 94] and the crop escapes heavy

infection; the next ploughing, however, brings the spores to the surface and the disease may be severe.

Duran (R.) & Fischer (G. W.). **Further studies on the synonymy and host range of the dwarf bunt fungus, Tilletia controversa.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 259–266, 2 pl., 1956.

Among numerous collections of *Tilletia* spp. on cereals and grasses from all over the world, examined at the Washington Agricultural Experiment Stations, Pullman, were several morphologically very similar to *T. controversa* [36, p. 235 and following abstracts]. Thus, *T. pancicii* [see above, p. 387] and *T. hordei* on *Hordeum* spp. and *T. calospora* on *Alopecurus* are regarded as synonyms of *T. controversa*, though final disposition of *T. hordei* must await examination of the type species, still unavailable. Many new hosts were established for *T. controversa*, an emended description of which, as a composite species, is given together with an up-to-date enumeration of the hosts and geographical distribution.

Holton (C. S.) & Kendrick (E. L.). **Problems in the delimitation of species of Tilletia occurring on Wheat.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 318–325, 3 pl., 1956.

Co-operative investigations by the United States Department of Agriculture and the Agricultural Experiment Stations of Idaho, Oregon, and Washington showed that there is a wide variability in some of the characteristics, spore wall markings in particular, delimiting species of *Tilletia* on wheat [34, p. 142 and preceding and following abstract]. Identification is complicated by intergradation between extreme types and natural hybridization between commingling species. By currently accepted criteria at least two additional species might be recognized, one producing head symptoms characteristic of common bunt (*T. caries*) but having spores with cerebriform reticulations and the other with sori separating the palea and lemma and showing between them, as in dwarf bunt (*T. controversa*), but having finely reticulate spores.

Considering the potential variability inherent in this group, the authors recommend a revision of the species concept, involving either the use of trinomials or the acceptance of broad ranges of variability in distinguishing characteristics.

Siang (W. N.). **Studies on the physiology and nutrition of Tilletia caries and T. controversa.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 291–306, 3 pl., 1956.

Cultural studies at the Washington Agricultural Experiment Stations demonstrated that neither *Tilletia caries* nor *T. controversa*, both from wheat [see preceding and following abstracts], required exogenous nutrients or growth factors for the germination of chlamydospores and sporidia. The optimum growth temperature was 15° C. for *T. caries* and 20° for *T. controversa*, both species growing well through a pH range of 3·7 to 9·2, though the former grew better than the latter on the alkaline side. Of the 21 carbon sources tested, sucrose, dextrose, and levulose were the most satisfactory, the optimal sucrose concentration being 4 per cent. for *T. caries* and 2 per cent. for *T. controversa*. L-asparagine [36, p. 182] was the only amide known to induce growth comparable to that in peptone and casein hydrolysate, both of which were readily utilized. Both species were heterotrophic for thiamine.

T. caries grew the more rapidly in culture, the maximum dry weight being reached in 14 days compared with 18 for *T. controversa*.

Holton (C. S.) & Siang (W. N.). **Fusion between primary sporidia derived from different species of Tilletia occurring on Wheat and certain grass hosts.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 326–330, 1956.

In culture studies carried out jointly by the United States Department of Agri-

culture and the Agricultural Experiment Stations of Idaho, Oregon, and Washington, cross-mating primary sporidia of *Tilletia* spp. occurring on wheat and on some grasses revealed both positive and negative compatibility relationships. Sporidia of the species causing dwarf bunt of wheat (considered not clearly defined by present criteria) [see preceding abstracts] fused readily with those of *T. guyotiana* from *Bromus japonicus* [see above, p. 387], *T. fusca* from *Festuca pacifica*, and *T. caries* from *B. tectorum* and *B. marginatus* [see next abstract], but not with those of *T. holci*, *T. cerebrina*, *T. asperifolia*, or *T. elymi*. Different degrees of compatibility were indicated by the percentages of fused pairs and by their further development. Such fusions may be of value in the study of taxonomic relationships.

Meiners (J. P.). **Extension of the known grass host range for Tilletia caries by inoculation.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 331–336, 3 pl., 1956.

In inoculation studies by the United States Department of Agriculture and the Agricultural Experiment Stations of Idaho, Oregon, and Washington, using ten physiologic races of *Tilletia caries*, a further 23 species of grasses, representing eight genera, were added to the known host range [see preceding abstract]. Of the 30 species infected, 22 were in the tribe Hordeae, six in Festuceae, and two in Avenae, this being the first record of grasses other than Hordeae to be susceptible to *T. caries* by inoculation.

Most of the natural grass hosts of dwarf bunt [*T. controversa*] were susceptible to *T. caries* race T-16 [35, p. 667], used as a dwarf bunt test race.

Kendrick (E. L.). **Pigmentation of the culture medium as an indicator of sex compatibility in Tilletia caries.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 337–342, 1 pl., 1956.

An association between compatibility and the development of a reddish-brown pigment in potato sucrose agar was established in sets of monosporidial lines of three races of *Tilletia caries* [see preceding abstracts]. Observations of sporidial fusion in culture showed that pigmenting and non-pigmenting lines from the same chlamydospore were of opposite compatibility. The association was not sex-specific, since sets of pigmenting lines from different spores were sometimes of opposite sex. Pigmentation appeared to be influenced by temperature and was most stable in race T-16, least in T-10, and showed some instability in T-15.

Fischer (G. W.) & Duran (R.). **Some new distribution and early incidence records of dwarf bunt of Wheat and Rye.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 267–274, 2 pl., 1956.

A study of numerous herbarium specimens revealed new records of the early incidence and geographical distribution of dwarf bunt (*Tilletia controversa* [map 297; see preceding and next abstracts]. It occurred in the United States [cf. 35, p. 173] (New York) on wheat in 1860 and on rye in 1892; on wheat in Czechoslovakia in 1847, Yugoslavia in 1944, and Iraq in 1908, and on rye in Poland in 1874.

Fischer (G. W.). **The species of Tilletia on Rye.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 275–290, 1 pl., 1956.

The results of studies on some 60 collections and on published records indicate that there are four distinct species of *Tilletia* on rye, namely, *T. foetida* with smooth spores and *T. caries*, *T. controversa* [36, p. 236 and preceding abstract], and *T. secalis*, all with reticulate spores. *T. controversa* has greenish-black, rounded, more or less indurate spore balls, the spores with gelatinoid sheaths. *T. secalis* does not cause dwarfing and the balls are brownish, elongate, and fragile, with a more or less dusty spore mass, the spores usually having no sheaths. It is suggested that the lectotype of *T. secalis* should be Rabenhorst's *Uredo secalis*, issued as No. 1399 of

Klotzsch's Herbarum Vivum Mycologicum and the basis of Körnicke's binomial, *T. secalis*.

Yakovlev (A. G.). Борьба с гибелью озимой Пшеницы. [Control of killing of winter Wheat.]—Земледелие [*Zemledelie, Moscow*], 4, 9, pp. 123–124, 1956.

In the northern regions of the European S.S.S.R. winter wheat is killed off during the winter, often by fungi such as species of *Fusarium* and *Sclerotinia*. At the Falensky State Selection Experiment Station, Kirovsky region, following one and two applications of granosan dust (6 kg. per 1 ha.) or of NIUIF-1 (500 l.) spray no plants were killed off, as against 1 and 2 per cent. deaths caused by *Sclerotinia*, sp. in the untreated in two trials; yields were increased from 27·3 (untreated) to 39·6 and 37·7 c[entners] per ha., respectively.

Owing to the difficulty of handling NIUIF-1, granosan is regarded as preferable for general use.

Leukel (R. W.) & Tapke (V. F.). **Barley diseases and their control.**—*Fmrs' Bull. U.S. Dep. Agric.* 2089, 28 pp., 22 figs., 1956.

Barley diseases reduce annual yields in the United States by five per cent. or more. This well-illustrated bulletin describes the main diseases with notes on their control, including a section on seed treatment [cf. 35, p. 516]. Covered smut (*Ustilago hordei*) [36, p. 17] destroys from 500,000 to 4,000,000 bushels each year. Nigra loose smut (*U. nigra*) [35, p. 670], first distinguished from *U. nuda* [36, p. 96] in the United States in 1932 [12, p. 161], destroys about 1,000,000. *U. nuda* is embedded so deeply in the kernel that seed dressings are ineffective, and only very careful hot water treatment will serve. Stem rust (*Puccinia graminis*) [36, p. 96] sometimes causes serious injury, and leaf rust (*P. hordei*) [34, p. 31] is occasionally destructive to winter but seldom to spring barley. Powdery mildew (*Erysiphe graminis*) [36, p. 18] is more important on barley than on other cereals and may reduce yield by 25 per cent. Scab (*Gibberella zeae*) [35, p. 96], which also causes foot rot and seedling blight, is commonest in the eastern and central corn belt. Stripe disease (*Helminthosporium gramineum*) [36, p. 18] causes considerable damage in California and the south central States, but is unimportant in the north central States. *H. sativum* [*Cochliobolus sativus*: 32, p. 629] is widespread and destructive and may be seed-borne or present in the soil. Net blotch (*H. teres*) [*Pyrenophora teres*: 35, p. 96] is very common, especially when cool weather prevails during the growing period.

Bacterial leaf blight (*Xanthomonas translucens*) [29, p. 555] is widespread, especially in spring barley areas, but is usually unimportant. Scald (*Rhynchosporium secalis*) [see next page] is important chiefly in California and in the winter barley areas of the mid-eastern, south-eastern, and extreme south-western United States. Stripe mosaic virus disease [36, p. 314], first diagnosed in 1950, occurs in all barley-producing regions and is serious in some spring barley areas. Yellow dwarf virus disease [see next page], first observed in California in 1947, was not diagnosed until 1951, when it caused a ten per cent. loss there. Miscellaneous root rots may cause considerable damage, and are best countered by seed treatment and good husbandry.

Moseman (J. G.) & Powers (H. R.). **Function and longevity of cleistothecia of Erysiphe graminis f. sp. hordei.**—*Phytopathology*, 47, 1, pp. 53–56, 1957.

A study was made at Beltsville, Maryland, of the cleistothecia of mildew (*Erysiphe graminis*) on winter barley [23, p. 291; 36, p. 18]. In 1952 and 1954 ascospore discharge in summer followed cool, wet weather in North Carolina, but caused no infection in the field. Ascospores were formed more rapidly when submerged in water than in a moist atmosphere, and were discharged under both conditions.

Alternate wetting and drying and changes of temperature did not increase ascospore formation or discharge. The minimum temperature for ascospore discharge and germination was 8° C. and the optimum 16° to 20°. The maximum for discharge was 24° and for germination 28°. Cleistothecia from mycelium in dried leaves stored for 13 years yielded viable ascospores; these organs would be suitable, therefore, for preserving races of *E. graminis*.

PARMENTIER (G.). **Essai d'orientation pour l'étude de l'efficacité des fongicides contre l'Oidium des céréales.** [Preliminary test for the study of the efficacy of fungicides against *Oidium* of cereals.]—*Parasitica*, 12, 3, pp. 74–86, 1 graph, 1956.

Details are given of a preliminary test carried out at the State Phytopathological Station, Gembloux, Belgium, of the efficacy of a large number of fungicidal products (used with and without wetters) against powdery mildew (*Erysiphe graminis*) on Herta barley [cf. 34, p. 779]. The work was carried out in a glasshouse and in a glass-covered shelter in the open.

The results showed that no product tested constantly gave adequate control by itself. Efficacy was, however, much increased by the addition of a wetter. Of the materials tested, wettable sulphur, dinitrooctylphenol crotonate, and barium polysulphide gave the best results, provided a suitable active wetting agent was added. The wetting agents themselves, whether anionic or non-ionic, displayed marked fungitoxic properties.

SCHEIN (R. D.) & KERELO (J. W.). **Culturing Rhynchosporium secalis.**—*Plant Dis. Reptr*, 40, 9, pp. 814–815, 1956.

In a new technique used at the Pennsylvania Agricultural Experiment Station for isolating *Rhynchosporium secalis* from barley [32, p. 16], tissue pieces were wetted for 15 to 20 secs. in 70 per cent. ethyl alcohol, submerged for 90 seconds in sodium hypochlorite diluted 1 in 9 with water, and transferred to agar slants. Lima bean agar proved the most satisfactory medium for sporulation.

ALLEN (T. C.). **Strains of the Barley yellow-dwarf virus.**—Abs. in *Phytopathology*, 46, 11, p. 634, 1956.

When the barley varieties Black Hulless (C.I. 666), Rojo (C.I. 5401), and Atlas 46 (C.I. 7323), and the oat variety Coast Black (C.I. 1025) were used as differential hosts 43 isolates of barley yellow dwarf virus [35, p. 761] occurring in the United States were separated into 16 strains, which could in turn be arranged in seven groups according to whether they were able or unable to produce symptoms on each host. Ten of the strains fell into two of these groups.

HALISKY (P. M.). **Inheritance of pathogenicity in Ustilago avenae.**—*Res. Stud. St. Coll. Wash.*, 24, 4, pp. 348–386, 8 pl., 1956.

At the Washington Agricultural Experiment Stations, Pullman, the F_1 from crosses between races A4, A6, and A7 of *Ustilago avenae* were characterized by either 4 : 0 or 3 : 1 ratios of strongly pathogenic to weakly pathogenic hybrids when tested on differential varieties of oats. The dicaryons in lines strongly pathogenic to Anthony, Black Diamond, Victory, and Gothland had AABB, AABb, AaBB, or AaBb genotypes and the weakly pathogenic had AAbb, Aabb, aaBB, aaBb, or aabb. Differences in pathogenicity between A5 and A6 on Monarch were governed by a single factor pair, A5 possessing an mm genotype and A6 an MM. Another factor pair controlled the difference in pathogenicity between A6 (cc) and A7 (CC) on Camas. A hybrid dicaryon produced experimentally and characterized by a pronounced lack of infection on Monarch and a very high rate of infection on Camas is considered to be a new pathogenic race, which has maintained its identity for three successive generations. Its genotype is postulated as ABmmCC.

Hassan (S. F.). **Pathogenicity of root rotting fungi of Oats.**—*Plant Dis. Reptr*, 40, 10, pp. 890–897, 3 graphs, 1956.

During a survey in 1946–7 of fungi causing root rot and seedling blight of oats in Minnesota, *Fusarium* and *Helminthosporium* spp. [cf. 35, p. 519], particularly *F. roseum* f. *cerealis* [35, p. 366] and *H. victoriae*, were most commonly isolated from seeds and the basal parts of diseased plants. *H. pedicellatum* was obtained from oats for the first time. Other isolates were *Rhizoctonia* [*Corticium*] *solani*, *Pythium irregulare*, *Alternaria* spp., *Phoma terrestris*, *Trichoderma* spp., *Rhizopus* spp., and *Aspergillus* spp., the last five being non-parasitic in greenhouse inoculation experiments. *F.* spp. caused little damage when alone, though a few isolates of *F. roseum* f. *cerealis* were virulent on Clinton seedlings. Damage to oats of Victoria parentage was due chiefly to *H. victoriae*, of which three physiologic races were distinguished. R-57 was the only strongly pathogenic isolate of *C. solani* among 12 tested; it attacked wheat, rye, barley, and soy-beans as well as eight varieties of oats. One isolate of *P. irregulare* was virulent at high temperatures.

Griffiths (D. J.). **The development of disease-resistant varieties of Oats.**—*J. agric. Soc. Univ. Coll. Wales*, 36, pp. 25–29, 31–32, 1955.

At the Welsh Plant Breeding Station, Aberystwyth, in 1954, a year of high incidence of powdery mildew (*Erysiphe graminis*) [33, p. 344], the yield in cwt. per acre of the resistant oat selections 4757/6/2/19 and 4757/18/2/19 was 30·5 and 29·2 against 21·8 and 18·7 for the susceptible varieties Sun II and S.84. Resistance is confined to *Avena sterilis* and *A. strigosa* and their subspecies. Selections originating in a cross betweeen the hybrids Victory × Red Algerian and Red Rustproof × Record show moderate greenhouse but fairly high field resistance to seedling and adult infections. A highly resistant unidentified form, Cc4146, probably derived from a natural cross between *A. sativa* and *A. ludoviciana*, was obtained in 1947.

No oat variety commonly used in the United Kingdom has proved resistant to any of 13 distinctive races of crown rust (*Puccinia coronata*) [loc. cit.; 36, p. 314] isolated from Wales and south-west England. Resistance lies chiefly in varieties of *A. byzantina*, *A. sterilis*, *A. ludoviciana*, and *A. strigosa*. Landhafer, Acencao, and Santa Fe (C.I. 4519) [see next abstract] were resistant to all 13 races, Victoria and Tama to 12, and Bond, Clinton, Eaton, and Shelby to 11.

Simons (M. D.). **Physiologic races of crown rust of Oats identified in 1955.**—*Plant Dis. Reptr*, 40, 9, pp. 810–813, 1956.

Since the last compilation of previously unnumbered races of crown rust (*Puccinia coronata*) of oats [35, p. 761], one new race (289) has been discovered in New Zealand, and 383 isolates, distributed among 18 races, have been identified from uredial material collected in the United States, Canada, and Mexico in 1955. Race 202 comprised 47 per cent. of the total, followed by races 203 (19 per cent.) [see next abstract] and 258 (6). Races 202 and 203 comprised 42 and 23 per cent., respectively, of the 166 isolates (15 races) identified from aecidial material collected primarily from *Rhamnus cathartica*.

Races attacking Victoria were more common in the aecidial than in the uredial material, and no isolates from either material attacked Landhafer, Santa Fe [see preceding abstract], Trispernia, or Bondvic.

Rosen (H. R.) & Bailey (L. F.). **Relationship of reaction type in crown rust to the rate of carbohydrate metabolism in Oats.**—Abs. in *Phytopathology*, 47, 1, p. 29, 1957.

It was found [at the University of Arkansas] that the immunity of certain oat selections from race 203 of crown rust [*Puccinia coronata*: 35, p. 601 and preceding abstract] below 70° F. could be broken by adding carbon dioxide to the atmosphere

(optimum concentration 0·15 per cent. applied immediately after inoculation, optimum time 48 hours) or spraying a sucrose solution on to the leaves. It would appear that the rate of carbohydrate metabolism of the host and availability of carbohydrates to the parasite are critical factors in host reaction.

Stewart (D. M.), Roane (C. W.), Loegering (W. Q.), & Roberts (B. J.). **A new sub race of the Oat stem rust fungus from Barberry.**—Abs. in *Phytopathology*, 47, 1, p. 34, 1957.

Varieties of oats and wheat of known susceptibility to various races of *Puccinia graminis* were grown in south-west Virginia near to barberry inoculated with teleutospores of the rust from various localities. Identification of the rusts that appeared subsequently on the cereals disclosed a new sub race, 5-US 1, which attacked Saia oats (*Avena strigosa*), resistant to race 5.

Golenia (A.). **Ulepszony przyrząd ręczny do zakażania Żyta sporyszem (Claviceps purpurea Tul.).** [A perfected hand apparatus for artificial inoculation of Rye with ergot (*Claviceps purpurea* Tul.).]—*Biul. Państw. Inst. Nauk. Les. Surow. Roś. Poznań.*, 11, 2 (6), 5 pp., 2 diags., 1956. [Russian and German summaries. Received 1957.]

A description is given of a hand apparatus, simple in design and use, for inoculating rye with *Claviceps purpurea* [cf. 32, pp. 124, 478, and next abstract]. In experiments in Poland 1 ha. of rye (which yielded 150 to 250 kg. of sclerotia) was inoculated in about 300 working hours. The amount of inoculum required was about half that generally used. The inoculating fluid runs out of a container on the shoulder of the worker on to a revolving brush which presses the spore suspension on to the inoculating needles.

Golenia (A.) & Pawełczyk (E.). **Hodowla sporyszu (Claviceps purpurea Tul.). Metoda otrzymywania materiału infekcyjnego.** [Breeding ergot (*Claviceps purpurea* Tul.). A method of obtaining infection material.]—*Farm. Polsk.* 5, 7 pp., 5 figs., 1954. [Received 1957.]

At the State Institute of Forest Sciences of Plant Raw Material at Poznań, Poland, a method was developed for obtaining cultures of *Claviceps purpurea* for the mass inoculation of rye [see preceding abstract]. The method is based on field and laboratory observations on the physiology of the fungus.

Milovidov (P.). **Příspěvek k mikroskopicko-morfologickému studiu vývoje námele (Claviceps purpurea (Fries) Tul.). II.** [Contribution to the microscopic-morphologic study of ergot development (Claviceps purpurea (Fries) Tul.). II.]—*Preslia* (formerly *Studia bot. čechosl.*) 28, 4, pp. 380–392, 1956. [Russian and German summaries.]

In further studies in Prague [cf. 34, p. 225] the author found that the sclerotia of *Claviceps purpurea* [36, p. 97] on nine species of grass belonging to eight genera were structurally similar to those on rye. Sclerotia resulting from artificial infection of rye haulms were also similar though the shape was sometimes irregular. It was found possible to produce sclerotia in emasculated rye flowers.

If the sphacelial surface of a young sclerotium is damaged by wounding it is replaced. Deeper wounds become covered by a hard cortical layer.

Békeśy (N.). **Über die technischen und agrotechnischen Fragen der Mutterkornkultur.** [On the technical and agrotechnical problems of ergot cultivation.]—*Pharmazie*, 11, 5, pp. 339–350, 5 figs., 3 diags., 5 graphs, 1956.

This is an informative commentary, based on 29 contributions (including seven by the author) [35, p. 821] to the relevant literature, on the large-scale cultivation

of rye ergot [*Claviceps purpurea*], with special reference to Hungarian conditions. The material is presented under the following headings: experimental technique, inoculation machines, choice of the rye variety for ergot cultures, stand density, number of conidia in the inoculum, times of inoculation and collection, and risk of contamination and other dangers of ergot cultivation.

Jung (M.), Stahl (E.), & Rochelmeyer (H.). **Zur Frage der Ein- oder Mehrkernigheit der Konidiosporen von Claviceps purpurea Tul. (Mutterkorn).** [On the question of the mono- or plurinuclear condition in the conidiospores of *Claviceps purpurea* Tul. (ergot).]—*Naturwissenschaften*, 44, 4, p. 95, 1 fig., 1957.

In view of the prevailing uncertainty as to the number of nuclei in the conidia of *Claviceps purpurea*, the causal organism of rye ergot, the authors studied this problem at the Pharmaceutical Institute of the Johannes Gutenberg University, Mainz, Germany. Only one nucleus of normal size was detected in material stained by Feulgen's method and with gentian violet.

Robert (Alice L.). **Bacterial wilt and Stewart's leaf blight of Corn.**—*Fmrs' Bull. U.S. Dep. Agric.* 2092, 13 pp., 10 figs., 1 map, 1955.

This bulletin on bacterial wilt of sweet corn [maize] and Stewart's leaf blight of dent maize, both caused by *Bacterium* [*Xanthomonas*] *stewarti* [35, p. 673], supersedes No. 1878 [20, p. 527]. Breeding for resistance is the only practicable means of control, and development of early-maturing resistant yellow hybrids has been so successful that by 1954 serious damage from bacterial wilt was no longer feared. Practically all white sweet corn hybrids containing lines of Country Gentleman and Stowell Evergreen are resistant to bacterial wilt. Specific breeding against the leaf blight has not yet been undertaken, but a number of hybrids show resistance.

Williams (L. E.) & Lockwood (J. L.). **Effect of antibiotics and surface-active agents on bacterial wilt of Sweet Corn in the greenhouse.**—*Phytopathology*, 47, 1, pp. 44–48, 1957.

At Ohio Agricultural Experiment Station, Wooster, three-leaf seedlings of Golden Bantam sweet corn [maize] were sprayed in the greenhouse with one of four antibiotics and 24 hours later injected at the culm base with *Bacterium* [*Xanthomonas*] *stewarti* [cf. 35, p. 292]. Both streptomycin sulphate and penicillin-G failed to give control at 500 p.p.m. Terramycin (500) and actidione (50 and 500) gave some control, but the latter was highly phytotoxic at both concentrations, though recovery occurred. Control by streptomycin and terramycin was enhanced by enclosure in a moist chamber for 24 hours after spraying. The addition of 10,000 p.p.m. of glycerol to the sprays had no effect [cf. 35, p. 700]. As a seed treatment against *X. stewarti* streptomycin gave some control but with accompanying phytotoxicity at 200 p.p.m.

Of nine surfactants tested, four tween preparations, triton X-155, ivory soap flakes, and dreft gave some control at 10,000 p.p.m.; triton X-114, very phytotoxic at 10,000, was effective at 1,000 p.p.m. As tween 20 is non-toxic to *X. stewarti* in culture at 100,000 p.p.m. (10 per cent.), the control action of such surfactants must lie in their absorption by the host and the subsequent modification of its susceptibility.

Robert (Alice L.). **Helminthosporium maydis on Sweet Corn ears in Florida.**—*Plant Dis. Reptr*, 40, 11, pp. 991–995, 2 figs., 1956.

Blackening of silks and ear tips on Ioana maize and occasionally Golden Security near Fort Myers, Florida, in 1955, was caused by *Cochliobolus heterostrophus*. Though the agent of a serious leaf blight in peninsular Florida [35, p. 672] the fungus

does not appear to have been recorded previously on the ears in the United States [cf. 13, p. 366].

Kišpatić (J.). **Smeđa pjegavost Kukuruza.** [Brown spot of Maize.]—*Zasht. Bilja (Plant Prot., Beograd)*, *1956*, 36, pp. 43–48, 1 fig., 1956. [English summary.]

At the Faculty of Agriculture and Forestry, Zagreb, an examination of diseased leaf samples showed that the only *Helminthosporium* species attacking maize in the northern or principal growing areas of Yugoslavia is *H. turcicum* [36, p. 6].

Ocfemia (G. O.) & Celino (M. S.). **Note on the presence on Sorghum of symptoms like those of the Fiji disease of Sugar Cane.**—*Philipp. Agric.*, 38, 8, pp. 558–559, 1 fig., 1955. [Received January, 1957.]

A disease of sorghum characterized by shortened stalks, with elongate, straw-coloured galls on the lower surface of the midrib, lamina, and leaf sheaths, was observed in the Philippines in 1954. The symptoms resembled those of the Fiji virus disease of sugar cane [35, p. 634].

Samson (J. A.). **Een vernevelprogramma voor de Citruscultuur.** [An aerosol programme for Citrus cultivation.]—*Surinaam. Landb.*, 4, 6, pp. 226–228, 1956. [English summary.]

Since the substitution of inexpensive portable mist blowers, with a water requirement of only about 100 l. per ha., for the hydraulic spraying machines, with a consumption of 2,000 l., which were formerly used on citrus plantations in Surinam [35, p. 889], economies of 50 per cent. in chemicals and even more in wages and other costs have been effected. The following schedule is proposed for the control of [unspecified] fungal diseases and insect pests: (1) in January or shortly after flowering, 15 wettable sulphur, 10 zinc sulphate, 5 manganese sulphate, 8 copper oxychloride, and 6 slaked lime (all expressed in kg. per 200 l. water); (2) in June, just before picking (stems only), chlordane or dieldrin miscible oil, the former at 70 and the latter at 20 per cent. (3 l. per 200 l.); (3) at the onset of the dry season in September, wettable sulphur 15; and (4) at the beginning of the minor rainy season in November, a repetition of (2).

Haas (A. R. C.) & Brusca (J. N.). **Nitrate levels for Valencias.**—*Calif. Agric.*, 10, 11, pp. 8–9, 6 figs., 1956.

Valencia orange trees, in loamy soil in pails, at the University of California, Riverside, were given various levels of nitrogen as calcium nitrate. At the higher nitrate levels the growth of tops and roots was considerably improved by the addition of potassium and phosphate. After several years of healthy growth copper became the limiting factor and symptoms of deficiency appeared [30, p. 34], first in the plants receiving nitrate at 600 p.p.m. and then in those receiving the lower levels. The initial symptoms frequently pass undetected. Gum blisters or pockets may occur on the young twigs, often accompanied later by a brownish resinous excrescence. Among the first symptoms in the trees under study were the oval shape and silver to yellow colour of the fruit. The surface of the peel appeared as though attacked by red mite [*Paratetranychus citri*], and the oil glands were conspicuous. In advanced stages brown or nearly black spots or patches appeared, sometimes forming triangular depressions or splits which could be quite extensive. In some affected Washington navel orchards the fruits split into halves at the navel end.

Dickson (R. C.), Flock (R. A.), & Laird (E. F.). **Spread of tristeza on Citrus.**—*Calif. Agric.*, 10, 10, p. 4, 1956.

Much of the information in this paper has previously been noticed from another source [35, p. 888]. For the district of Covina-Azusa, S. California, where the spread

of tristeza virus disease has been most rapid, and where the population of the melon aphid [*Aphis gossypii*] is highest, it has been calculated that one new infection results from the movement of each 18,000 of these aphids from diseased to healthy trees. Five minutes feeding time is required for transmission of the disease.

Moore (P. W.), Nauer (E.), & Yendal (W.). **California scaly bark disease of Citrus.**—*Calif. Agric.*, 11, 2, pp. 8–9, 5 figs., 1957.

The information in this paper on psorosis virus of citrus has already been noticed from another source [35, p. 178].

Chapot (H.). **Une nouvelle maladie à virus des Agrumes dans le Moyen-Orient.** [A new virus disease of Citrus in the Middle East.]—*Fruits Prim. Afr. N.* 283, pp. 361–365, 2 figs., 1956.

After visiting Lebanon, Syria, and Turkey during 1956 the author concludes that a condition of citrus which he observed in these countries was stubborn disease [36, p. 184], that it is transmitted by an animal vector, and is identical with the xeromorphosis or little leaf disease reported from Palestine [36, p. 23].

Raciti (G.). **Carenza di magnesio negli Aranci siciliani. Diagnosi ed esperienze di cura. Nota I.** [Magnesium deficiency in Sicilian Orange trees. Diagnosis and treatment trials. Note I.]—*Ann. Sper. agr.*, N.S., 10, 5, pp. 1581–1597, 1 pl., 1956. [English summary.]

After stating that oranges, particularly the Sanguinello variety, growing in various localities in the Commune of Francofonte, Sicily, are affected by magnesium deficiency [35, p. 775] and describing the symptoms and the results of leaf analysis, the author gives a full account of preliminary treatment trials carried out in April, 1954, in which the most satisfactory result appeared to be given by an application to the soil of magnesium sulphate at the rate of 250 gm. per tree. Further work is in progress.

Ciccarone (A.). **Applicazioni di calciocianamide agli Agrumi ed infezioni di 'mal secco'. Prove orientative.** [Applications of calcium cyanamide to Citrus trees and infections by 'mal secco'. Preliminary experiments.]—*Riv. Agrumic.*, 1, 9–10, pp. 361–368, 1956. [English summary.]

In February, 1954, an experiment was carried out [in Sicily] in which potted sour orange seedlings were given approximately equimolecular amounts of nitrogen, applied as calcium cyanamide or ammonium sulphate, the plants subsequently being either artificially inoculated with *Deuterophoma tracheiphila* [36, p. 98] by various techniques or exposed to natural infection for several months. The results obtained indicated that the treatments did not materially affect the incidence of infection, but there was some evidence that the application of nitrogen might shorten the incubation period of the disease.

Schneider (Y. I.). Причины периодичности в развитии бактериального некроза Цитрусовых в природе. [Reasons for periodicity in the development of Citrus bacterial necrosis in nature.]—*Trud. vsesoyz. Inst. Zashch. Rast.* 4, pp. 77–82, 1952. [Received 1956.]

Much of this information on bacterial necrosis (*Bacterium citriputeale*) [*Pseudomonas syringae*] of citrus [32, p. 311] in the subtropical regions of the U.S.S.R. has already been noticed from another source [30, p. 464]. The disease occurs in three forms, as stem necrosis and leaf infection and, much less frequently, as black spot on the fruit. The physiological condition of the plant and temperature factors are chiefly responsible for periodicity in the development of the outbreaks.

Rai (J. N.). **Leaf blight disease of Citrus acida var. variegata.**—*Proc. Indian Acad. Sci.*, Sect. B, 43, 6, pp. 325–333, 7 figs., 1956.

From the Department of Botany, University of Lucknow, the author describes a leaf spot disease of a lime (*Citrus acida* [*aurantiifolia*] var. *variegata*) caused by a strain of *Colletotrichum gloeosporioides* [*Glomerella cingulata*] which differs from those previously encountered on citrus [cf. 1, p. 215; 33, p. 720]. The disease, most in evidence at the end of the rainy season and at the beginning of winter and spring, chiefly attacks the younger, chlorotic leaves, a slight initial discoloration giving way to brown areas, at first marginal, later spreading, sometimes with concentric rings, on which the acervuli appear. Infection of stem or fruit has not been observed.

Infection was induced artificially and was stimulated by wounding. On the leaves the acervuli measured 75 to 280 μ in diameter, and the spores 10 to $22 \times 4{\cdot}5$ to $6{\cdot}5$ μ. The morphology in culture is also described.

Phan-Chon-Tôn. **Observations sur la production d'éthylène par le Penicillium digitatum Sacc.** [Observations on the production of ethylene by *Penicillium digitatum* Sacc.]—*C. R. Acad. Sci., Paris*, 244, 9, pp. 1243–1246, 2 graphs, 1957.

Using the technique of Young *et al.* (*Analyt. Chem.*, 24, pp. 551–555, 1952) with slight modifications, the author found that the production of ethylene by the green mould of citrus, *Penicillium digitatum* [19, p. 529; 34, p. 240], coincides with the period of most active vegetative growth. The rate of production of the gas was considerably accelerated by the addition to the medium (orange peel agar plus 2 per cent. saccharose) of 2 per cent. glycerol or alanine and more especially of glucose at the same concentration.

Hewitt (E. J.) & Bull (R. A.). **A preliminary survey of deficiency symptoms in the Oil Palm belt of Nigeria.**—*J.W. Afr. Inst. Oil Palm Res.*, [1], 4, pp. 83–105, 2 col. pl., 5 figs., 1956.

This paper describes visual symptoms in oil palms due to potassium [see next abstract], magnesium [36, p. 243], and other deficiencies [34, p. 719], and deficiency symptoms in other crops, including coconut, rubber [cf. 35, p. 392], citrus, coffee [cf. 35, pp. 295, 523], and tomatoes [35, p. 342] which may serve as pointers for soil treatment in the Nigerian oil palm belt.

Severe potassium deficiency symptoms are frequently found in oil palms growing in degraded farmland in Nigeria, particularly in the Eastern Region, and the use of potassium fertilizers would probably increase yields in most of the oil palm area. Young palms deficient in potassium showed a chlorosis. Further elucidation is required for the relationship between orange spotting and potassium deficiency. Severe potassium deficiency may interfere with iron uptake, resulting in the appearance of secondary chlorotic symptoms.

Magnesium deficiency [34, p. 720] is a major disorder of oil palms and other crops in the Eastern Region and may be induced or accentuated by repeated applications of potassium. The presence of occasional palms suffering from 'plant failure', associated with severe deficiencies of magnesium or potassium as well as other disorders, has been regarded as revealing genetical differences in the nutritional status of palms in soils of marginal fertility which, however, might be expected to respond to fertilizer application. Applications of lime to oil palms almost always result in reduced vigour and yields, possibly owing to decreased availability of micronutrients.

Chapas (L. C.) & Bull (R. A.). **Effects of soil applications of nitrogen, phosphorus, potassium, and calcium on yields and deficiency symptoms in mature Oil Palms at Umudike.**—*J.W. Afr. Inst. Oil Palm Res.*, 2, 5, pp. 74–84, 1 graph, 1956.

Deficiency symptoms exhibited by oil palms [see preceding abstract] in the

fertilizer experiment on the Government Farm, Umudike, in the Eastern Region of Nigeria were of four types. Symptom A consisted of premature dessication of the older leaves, which turned greyish-brown when dead, and was significantly reduced by applications of potassium, but was more severe in plots that received phosphate without potassium than in plots that had received neither. Symptom B, termed confluent orange spotting, was also greatly reduced by potassium applications. Symptom C was similar to the early stages of orange frond disease, while symptom D was associated with the orange frond-orange spot complex in which large yellow or orange patches appear on affected pinnae, usually half way along the length of the leaf, between midrib and margin. These patches contain a mass of minute orange spots and eventually the leaflet tips turn brown or purple and become desiccated. Symptoms C and D were both least severe on plots which had received potassium, indicating the complexity of symptoms associated with potassium deficiency.

Bull (R. A.) & Chapas (L. C.). **Some effects of soil applications of magnesium sulphate on the visual symptoms and yields of magnesium deficient Oil Palms at Calabar.**—*J.W. Afr. Inst. Oil Palm Res.*, 2, 5, pp. 85–91, 1 graph, 1956.

In a fertilizer experiment over three years, at Calabar in Eastern Nigeria, soil applications of magnesium sulphate at rates between 5 and 7½ lb. per tree restored the health of oil palms suffering from orange frond disease [35, p. 449] and also resulted in a significant increase in yields of fruit bunches. Higher rates of magnesium sulphate (10 lb.) increased the number of bearing palms, but may possibly induce potassium deficiency.

Da Matta (E. A. F.). **Podridão das raízes do Dendezeiro (Elaeis guineensis-Jacq.) na Bahia (Brasil), causada por 'Fusarium sp.'** [Root rot of Oil Palm (*Elaeis guineensis* Jacq.) in Bahia (Brazil) caused by *Fusarium* sp.]—Reprinted from *Bol. Sec. Agric. Bahia*, 17, 11 pp., 3 figs., 1956.

A disease of oil palm seedlings in Bahia, Brazil, characterized by root rot and by small, yellow spots on the leaf edges, which become dark and finally involve the whole blade, is attributed to *Fusarium* sp. The symptoms, which were reproduced by inoculation, are similar to those of the blast disease of oil palm in West Africa [35, p. 448]. The disease has so far been observed only in seed-beds situated on low-lying, damp ground.

Ramakrishnan (T. S.) & Seethalakshmi (V.). **Studies in the genus Phytophthora. III. Homothallic strains of Phytophthora on Areca catechu.**—*Proc. Indian Acad. Sci.*, Sect. B, 43, 6, pp. 308–313, 1956.

In a further contribution to this series [cf. 27, p. 451] descriptions are given of five strains of *Phytophthora palmivora* isolated from diseased areca fruits in different parts of South Kanara [27, p. 159] and cultured at the Agricultural Research Institute, Coimbatore, Madras, from single sporangia. Three proved to be homothallic strains, producing oospores on carrot agar, while the remaining two were heterothallic, producing oospores with an isolate from betel vine (*Piper betle*). All five were pathogenic to fruits of areca, eggplant, and *Jatropha curcas*, coconut leaves, and papaw seedlings.

Bock (K. R.). **Investigations on Coffee berry disease—laboratory studies.**—*E. Afr. agric. J.*, 22, 2, pp. 97–103, 1 fig., 7 graphs, 1956.

Laboratory investigations of the disease of coffee berries attributed to *Colletotrichum coffeanum* [*Glomerella cingulata*: 35, p. 823] in Kenya showed that infection without previous wounding was obtainable by using spore suspensions obtained from surface lesions on detached berries. Invasion followed the usual pattern. The

average incubation period ranged from 6 to 14 days (sometimes only 72 to 84 hours with berries 1 to 5 mm. in diameter, and occasionally 21 days with green berries of maximum size).

Clusters of berries in the field enclosed in polythene bags for 13 weeks failed to develop any further lesions after 14 days, so that the cycle from penetration to lesion development appears to be a continuous process varying in rate within defined limits. In favourable conditions, the pink conidial aggregates are formed directly a lesion has become macroscopically visible. The optimum infection density appears to lie above 10^5 spores per c.cm. of suspension.

Low temperatures markedly depress the rate of lesion development, while fluctuating temperatures retard it only initially; some infection occurs at 10° to 12° C. Temperatures fluctuating between 5° and 8° inhibit lesion development but do not kill the conidia. When conidia in water droplets on the surface of green berries were exposed to a fan for 24 hours and then re-suspended in water *in situ*, 20 per cent. infection resulted.

Two types of natural lesions are produced. Some enlarge actively, are sunken, brown to black, and under favourable conditions develop pink conidial aggregates over the whole surface. Others (the 'scab' lesions described by McDonald [12, p. 8]) appear to be of limited size, and are slightly sunken, buff, with many to few scattered, minute, black, erumpent pustules. These two kinds of lesion are considered to be the expression of different host reactions to infection, though no mechanical barrier of any kind is formed by the berry. Both types of lesion may induce the formation of an abscission layer in the pedicel. The author considers that this limitation of fungal growth represents a plasmatic defence reaction, and is a function of the cell content.

Though coffee is apparently more susceptible at high than at low elevations, *G. cingulata* is able to infect certain varieties (e.g. Harar) actively at lower altitudes, which suggests that the effect of altitude is not exerted directly on the pathogen, but rather on the host-pathogen relationship, and primarily on the host.

Flores (M. A.), Pazos (R.), & LeBeau (F. J.). **A canker disease of Coffee in Guatemala.**—Abs. in *Phytopathology*, 47, 1, p. 11, 1957.

Inoculation of coffee bushes in Guatemala with *Nectria dodgei* [31, p. 302] (conidial state, *Cylindrocarpon* sp.), from old cankers gave a low-percentage of infection, from young cankers it resulted in 60 per cent., and using perithecia, 100 per cent. Infection occurs only through wounds and in a severely affected area 30 per cent. of healthy wounded trees became infected within 15 days, and 83 per cent. within 30 days. In wounds within 1 ft. of the ground incidence was greater than higher up. Certain varieties of *Coffea arabica* and *C. liberica* are resistant to natural infection.

Fraselle (J. V.). **La pourriture interne de la tige du Caféier Robusta.** [Internal decay of the trunk of *Robusta* Coffee.]—*Bull. Inform. Inst. Étud. agron. Congo belge*, 4, 5, pp. 339–348, 8 figs., 1955.

Robusta coffee in the Belgian Congo is occasionally affected by an internal necrosis of the trunk somewhat resembling the stem canker caused in South America by *Ceratostomella* [*Ceratocystis*] *fimbriata* [30, p. 366; 33, p. 80; 36, p. 319]. Oval cankers form on the trunk, and may girdle it. The centre of a lesion generally corresponds with the point of insertion of a branch that has been cut or broken off. Affected trees grow slowly, give a reduced yield, and finally develop a complete wilt of the crown. This process is often slow, suckers being put out from healthy tissues.

Internally, a white, dry rot is present in the centre of the lesions, the wood beyond being brownish-grey. An unidentified fungus constantly isolated from affected material is being studied.

As a preventive measure, all wound surfaces should be painted with 5 per cent. carbolineum or brunolinum. Diseased trees should be cut back to below the affected part, and the wound treated.

ZAMBETTAKIS (C.). **Fusarium oxysporum Schl. f. vasinfectum (Atk.) S. et H. Flétrissement du Cotonnier.** [*Fusarium oxysporum* Schl. f. *vasinfectum* (Atk.) S. & H. Cotton wilt.]—*Rev. Mycol., Paris*, 21, *Suppl. colon.* 1, Fiche 14, 7 pp., 1 fig., 1956.

Brief, popular notes are given on cotton wilt (*Fusarium oxysporum* f. *vasinfectum*) [*F. vasinfectum*], covering synonymy, geographical distribution, symptoms, and control.

SUBRAMANIAN (D.). **Role of trace element chelation in the Fusarium wilt of Cotton.** —*Proc. Indian Acad. Sci.*, Sect. B, 43, 6, pp. 302–307, 1956.

In further studies at the University Botany Laboratory, Madras [cf. 35, p. 607], the author demonstrated that cut shoots of cotton treated with 8-quinolinol (from 1 to 100 p.p.m.) for 24 hours and cotton seedlings grown for 10 days in sand cultures treated similarly were protected from the toxic effects otherwise induced by a dialysed culture filtrate of *Fusarium vasinfectum* [see following abstracts], the optimum range being 5 to 10 p.p.m. If the therapeutant and the culture filtrate were applied together there was no protection.

It seems that 8-quinolinol acts by chelating with the free heavy trace metal elements in the tissues to form a complex which is stable in the presence of the wilt toxin, which is thus prevented itself from forming chelates with these elements and causing wilt. Analagous behaviour by this substance has been recorded by Dimond in the case of *F. bulbigenum* var. *lycopersici* causing tomato wilt (*Annu. Rev. Pl. Physiol.*, 6, p. 329, 1955).

GNANAM (Miss P.). **Conductivity studies in Cotton plants infected by Fusarium vasinfectum.**—*Proc. Indian Acad. Sci.*, Sect. B, 44, 2, pp. 125–129, 3 graphs, 1956.

At the University Botany Laboratory, Madras, the tissue conductivity [cf. 36, p. 207] of leaves, stems and roots of healthy cotton seedlings and those infected by wilt [*Fusarium vasinfectum*; see preceding and following abstracts] was measured with a Mullard conductivity bridge on liquid samples obtained by grinding the washed tissues in a standard volume of water and removing solid matter by centrifugation.

In the tissues of infected plants marked fluctuation in conductivity occurred from the seventh day after germination until the 15th day, when systemic symptoms appeared, after which it ceased. Healthy plants showed little fluctuation throughout this period. It is suggested that the fluctuation is caused by imbalance of the ionic concentration in the cells due to partial dysfunction of cell permeability. The observations are considered further to support the view that vivotoxins [35, p. 387] are responsible for the wilt.

LAKSHMINARAYANAN (K.). **Physiology of host-parasite relationship in the Fusarium wilt of Cotton. I. Pectin metabolism.**—*Proc. Indian Acad. Sci.*, Sect. B, 44, 6, pp. 317–324, 1956.

In this study at the University Botany Laboratory, Madras, the author compared pectin levels in the leaves, shoots, and roots of seedlings of the susceptible cotton variety Karunganni-K 2 and the resistant varieties Cambodia (CO 2) and Madras Uganda (MU 1) after six and 12 days' growth in clean soil or in soil inoculated with *Fusarium vasinfectum* [see preceding abstracts].

In healthy plants the percentage pectin content of the roots was markedly higher

in the susceptible K 2 than in the resistant CO 2 and MU 1, after both six and 12 days' growth (16·3 as opposed to 2·8 and 1·5 after the longer period). Also, while the main seat of pectin synthesis and storage in K 2 is the root, in the resistant varieties it is in the shoots and leaves. In the infected K 2 plants the root pectin content had fallen to 10·4 (as opposed to 12·4 in the healthy) by the sixth day and to 1·3 by the 12th. In the resistant varieties, however, it was higher at both ages than in the healthy (rising to 3·8 and 5·8 in the two varieties, respectively, after 12 days). There appears to be close correlation between root pectic reserves and susceptibility, the availability of these to the pathogen in K 2 favouring infection, and their lack in the resistant roots limiting it [cf. 36, p. 27].

Malaguti (G.). **La escobilla del Algodón en Venezuela.** [Little broom of Cotton in Venezuela.]—*Agron. trop., Maracay*, 5, 2, pp. 73–86, 5 pl., 1955. [Received January, 1957.]

A disease of cotton, characterized by excessive sprouting of axillary and terminal buds, which has been occasionally observed in Venezuela since 1947, assumed epidemic proportions near Taiguaiguay in 1955. The causal organism was identified as *Colletotrichum* [*Glomerella*] *gossypii*, the symptoms corresponding to those of 'ramulosis' (*C. gossypii* var. *cephalosporoides*) in Brazil [32, p. 252], but the name 'little broom' is preferred, to avoid confusion with the disease caused by *Ramularia areola* [map 260].

The Marie Galante, Sabana, Monay, Delta Smooth Leaves, Acala, Saenz Peña, Express del Brasil, Dixie 14-5 strain 2, Stoneville 2-B, Watson, Early Cleveland W.R. strain 2, Watson Rowden 41-B, Coker 100 W.R. strain 4, Coker 4 in 1 strain 5, Tangüis, La Molina 1240, La Molina 117-38, S.N.A. 246, and S.N.A. 48 varieties were severely affected, Washington, Delfos 351-C, Delta Pine 14, S. & C. Big Ball, Roldo Rowden 41-A, Foster, I.A. 028-81045, I.A. 817, *Gossypium barbadense* var. Capullo, *G. barbadense* var. Domains Sakel, and Los Pereños being resistant, and Stoneville 5-A, I.A. 21077-75132, Tanganica, and Cambodia unaffected.

Stern (J. N.). **Danger of introducing Cotton root rot into central and southern Mexico.**—*Tex. J. Sci.*, 8, 3, pp. 360–363, 1956.

Cotton root rot (*Phymatotrichum omnivorum*), formerly limited in Mexico [map 15; 33, p. 26] to areas adjoining the United States border, from Lower California to Tamaulipas, is reported to have been spreading southwards during the past few years. The absence in Mexico of a natural barrier of low temperature calls urgently for the establishment of quarantines and new studies on ecological conditions promoting the development of infection. A joint effort of North American and Mexican scientists along these lines is suggested.

King (H. E.) & Lawes (D. A.). **Plant breeding.**—*Progr. Rep. Exp. Stas Cott. Gr. Corp. (Northern Nigeria) 1955–6*, pp. 4–15, 1957.

In a further experiment on the control of bacterial blight of cotton (*Xanthomonas malvacearum*) [35, p. 677] in Northern Nigeria, seed treatment with agrosan GN5 gave a total yield of seed cotton of 397 lb. per acre for strain 26 C, as against 347 lb. for the undressed; the corresponding figures for strain 26 J were 417 and 355 lb.

Costa (A. S.). **Anthocyanosis, a virus disease of Cotton in Brazil.**—*Phytopath. Z.*, 28, 2, pp. 167–186, 2 pl., 1956. [German summary.]

Anthocyanosis, a new disease, is reported to be widespread among commercial cotton varieties in São Paulo, Brazil, and to occur also in Rio Grande do Norte on the Marie Galante variety and in Paraíba on Watson and A.F.C. Abnormally large quantities of purple or reddish pigments are present in the lower or medium leaves. This feature is also associated with magnesium deficiency [34, p. 227] and,

in fact, virus infection is responsible for a reduction in the magnesium content of the foliage from a range of 0·94 to 1·31 to between 0·61 and 0·81 per cent.

In experiments at the Agronomic Institute, Campinas, consistently effective transmission by *Aphis gossypii* could be ensured only with a minimum of 10 insects per plant. An acquisition period of 24 or 48 hours was required and 12 hours or more for transmission. Dark-coloured aphids were rather more efficient vectors than yellow ones, while young, symptomless foliage was superior as a feeding source to older leaves with symptoms. The virus appeared from preliminary tests to be persistent in the vector. It is transmitted also by grafting, but not by sap or seed.

Natural hosts of the anthocyanosis virus in São Paulo include *Gossypium barbadense*, *Hibiscus cannabinus*, okra [*H. esculentus*], *Sida rhombifolia*, and *S. micrantha*, the two last-named weeds and ratoon cotton probably carrying it through the winter.

Mischke (W.). **Durch Insekten übertragbare Viruskrankheiten an Schnittblumen.** [Virus diseases of ornamentals transmissible by insects.]—*Pflanzenschutz*, 9, 2, pp. 23–25, 1957.

Useful information is summarized on the symptoms of the following viroses of ornamentals and the aphids concerned in their transmission [cf. 36, p. 323]: mosaic of dahlia, freesia [34, p. 228], gladiolus, narcissus, and iris; lily mosaic [tulip breaking virus], necrotic fleck caused by two viruses [lily symptomless and cucumber mosaic viruses, 29, p. 563], and rosette; tulip breaking; and carnation streak [cf. 28, p. 334], characterized by the development on the leaves, especially of highly-coloured varieties, of yellow and reddish spots running parallel with the veins, which are very prominent from March to May. The flowers are smaller, but are otherwise symptomless. It is transmitted by *Myzodes* [*Myzus*] *persicae*.

Salinger (J. P.). **Paeony ring-spot virus.**—*N.Z. Pl. & Gdns*, 2, 1, p. 32, 1956.

Because imported herbaceous and tree peony plants grown in post-entry quarantine in New Zealand have developed symptoms of peony ring spot virus [15, p. 99; 31, p. 491], the Dutch authorities have been requested by the Horticulture Division of the New Zealand Department of Agriculture to inspect peonies during the growing season and to state that the exported plants are visibly free from virus disease. Imported peony plants are not released until the Horticulture Divisional Officers in New Zealand are satisfied that they are healthy and free from virus disease.

Brierley (P.) & Lorentz (P.). **Hydrangea ringspot virus, the probable cause of 'running-out' of the florists' Hydrangea.**—*Phytopathology*, 47, 1, pp. 39–43, 1 pl., 1957.

An account is given of investigations at Beltsville, Maryland, of hydrangea ring spot virus, causing chlorotic or brown rings and oak leaf patterns [34, p. 456] on *Hydrangea macrophylla* and found in all the commercial varieties tested. The symptoms on a number of varieties are described; they vary with the degree of tolerance of the host, but only Charm and Sainte Speer are rendered unsaleable. The virus proved transmissible by the cutting knife in these experiments, which tomato ring spot virus, also found on hydrangea [loc. cit.], was not. Neither virus was transmitted by seed, but both were transmissible by carborundum rubbing to *Gomphrena globosa*, producing distinctive local lesions, though only tomato ring spot becomes systemic on this host [see above, p. 375]. Hydrangea ring spot virus was also transmitted to *Amaranthus retroflexus*, antirrhinum, sugar beet, *Chenopodium album*, *C. amaranticolor*, cucumber, and *Dianthus barbatus*, producing local lesions. It failed to infect [chilli] pepper, tobacco, tomato, China aster, chrysanthemum, petunia, bean (*Phaseolus vulgaris*), and zinnia. The virus (in unpurified extracts) withstood heating to 74° C., dilution to 10^{-5}, and ageing for 14 days.

Skiver (R. E.). **The use of antibiotics and fungicides in mist propagation.**—*Plant Dis. Reptr*, 40, 12, pp. 1074–1080, 1 fig., 1956.

At the Botany and Plant Pathology Department, Colorado A & M College, Fort Collins, a number of fungicides were introduced into the stream of the mist propagation system for the control of *Alternaria* blight (*A. dianthi*) [35, p. 380] and rust (*Uromyces caryophyllinus*) [*U. dianthi*: 26, p. 347] of inoculated Miller's Yellow and Red Sim carnation cuttings rooting in the greenhouse. Incidence of *A. dianthi* was significantly reduced by captan (19 p.p.m.), tomatine (2 p.p.m.), and the pyridinethione derivatives (Olin Mathieson Chemical Corp.) omadine 1456 (10 p.p.m.), omadine 1564, and omadine 1483 (both 2 p.p.m.), all applied for 21 days except omadine 1456 (7 days), but all the chemicals reduced rooting. On the whole, Miller's Yellow developed a better root system under mist than Red Sim, irrespective of treatment. The amount of rooting was always less in cuttings infected by *A. dianthi* than in the non-inoculated. Rust was of little importance under the conditions of the experiment.

Moreau (Mireille). **Localisation des enzymes oxydants chez l'Œillet cultivé.** [Localization of oxidizing enzymes in the cultivated Carnation.]—*C. R. Acad. Sci., Paris*, 244, 10, pp. 1408–1411, 1957.

A comparative study of the root, collar, primary stem, leaf, and petal tissues of two-year-old plants of the Anita, Boreal, Versailles, and Saint-Christophe carnation varieties, stained with tincture of guaiacum and hydroquinone, revealed an abundance of non-lignified parenchyma, reacting with an intense blue coloration, in the collar wood of the first-named. To this protracted retention of its enzymatic activity is attributed the high degree of resistance of the variety to spontaneous infection by *Fusarium roseum* and inoculation with *Phialophora* [*Verticillium*] *cinerescens* [35, p. 767 and below, p. 415].

Georgescu (C. C.), Mocanu (Victoria), & Orenski (S.). **Tracheomicoza la Elaeagnus angustifolia produsă de Fusarium oxysporum Schlecht. var. orthoceras (App. et Wr.) Bilai comb. nova.** [Tracheomycosis of *Elaeagnus angustifolia* caused by *Fusarium oxysporum* Schlecht. var. *orthoceras* (App. & Wr.) Bilai n. comb.]—*Bul. ști. Acad. Repub. rom.*, 8, 3, pp. 697–707, 1 fig., 1956. [Russian and French summaries. Received 1957.]

In studies in Romania *Fusarium oxysporum* var. *orthoceras* [*F. orthoceras*] was isolated from *Elaeagnus angustifolia* with symptoms of tracheomycosis. A seven-year old plant and parts thereof were successfully inoculated under laboratory conditions, using minute quantities of a malt agar culture.

Athow (K. L.) & Davis (R. L.). **Inheritance studies on northern and southern anthracnose of Red Clover.**—Abs. in *Phytopathology*, 47, 1, p. 2, 1957.

After inoculation with the pathogen and selection, plants of the Dollard and Purdue red clovers resistant to *Kabatiella caulivora* [35, p. 159], and of Kenland, resistant to *Colletotrichum trifolii* [35, p. 21] were crossed. The resistance to both diseases in some 9 per cent. of the F_2 indicated this to be a recessive character. Resistance to each disease separately also seems to depend on a single recessive factor.

Walker (J.). **The reaction of subterranean Clover varieties to scorch caused by Kabatiella caulivora (Kirchn.) Karak.**—*J. Aust. Inst. agric. Sci.*, 22, 4, pp. 288–291, 1 fig., 1956.

In November, 1955, subterranean clover in the Berrigan Irrigation Area, New South Wales, was attacked by scorch (*Kabatiella caulivora*) [35, p. 661], a new

record for Australia and apparently the first record on this species of clover. Reduction of yield ranged up to 90 per cent.; in some places, complete loss of grazing resulted and seed-setting was greatly reduced. The variety chiefly attacked was Bacchus March, but Mount Barker was also affected.

In inoculation experiments on potted plants of a large number of subterranean and other clovers [cf. 7, p. 584] all proved susceptible to some extent except two lines of subterranean clover, Mulwala and Wallace. Subterranean clover was as a rule most susceptible, but there was considerable varietal difference, and in addition to the two resistant varieties named, two lines of Tallarook from different sources were in one case severely, but in the other only slightly affected. Crimson clovers proved very susceptible, but white and red clover were only slightly attacked. Berseem (*Trifolium alexandrinum*) and *T. dubium* were also infected.

Graham (J. H.). **A Stemphylium disease of Ladino white Clover.**—Abs. in *Phytopathology*, 47, 1, p. 13, 1957.

A newly reported disease of Ladino white clover observed for three years in central Pennsylvania causes marginal leaf lesions, light brown necrotic areas up to 6 mm. across. The causal organism is proposed as a new species, *Stemphylium trifolii* [without a Latin diagnosis: cf. 34, p. 154]. Lucerne, sweet clover [*Melilotus*], and many species of *Trifolium* proved susceptible to inoculation. Sclerotial bodies produced remained undifferentiated.

Burkholder (W. H.). **A bacterial disease of Clover and Velvet Beans.**—*Phytopathology*, 47, 1, pp. 48–50, 1 fig., 1957.

In the summer of 1954 leaves of white clover on the lawns at Cornell University, Ithaca, New York, showed necrotic, dark brown lesions [cf. 36, pp. 103, 192], initially with a water-soaked margin on the under surface. Finally the whole leaflet died. There were dark areas also on the stipules. The causal organism proved to be *Pseudomonas stizolobii* (Wolf) Stapp isolated from velvet bean (*Stizolobium deeringianum* [*Mucuna deeringiana*]) in North Carolina [7, p. 642], and only twice recorded since, from Brazil.

Ladino clover, red clover, red kidney bean (*Phaseolus vulgaris*), and *Lespedeza* proved susceptible; nine other legumes were immune.

Staple (C.). **Nogle Lucernesygdomme.** [Some Lucerne diseases.]—Reprinted from *Landbonyt, 1956*, June, 7 pp., 6 figs., 1956.

Information is presented in popular terms on lucerne diseases in Denmark, including leaf spot [*Pseudopeziza medicaginis*], rot [*Sclerotinia trifoliorum*], black stem [*Ascochyta imperfecta*], and wilt [*Verticillium albo-atrum*], of which the last-named is particularly virulent, destroying large areas or even an entire stand in a week or two during hot weather.

Quantz (L.). **Zum Nachweis des Luzernemosaikvirus in Deutschland und Italien.** [On the demonstration of Lucerne mosaic virus in Germany and Italy.]—*Phytopath. Z.*, 28, 1, pp. 83–103, 16 figs., 1956.

At the Institute for Agricultural Virus Research, Brunswick, mosaic lucerne plants collected in Western Germany and a specimen received from Milan were shown to be infected by lucerne mosaic virus [35, p. 895], which was also isolated from a white clover plant growing at the edge of an experimental field at the Biological Institute, Brunswick. Symptoms of the disease, which were most prominent at moderate spring temperatures, included yellow leaf-spotting, ring patterns or pale parallel stripes along the lateral veins, and foliar curling and stunting.

The virus was transmissible by sap inoculation and grafting to bean (*Phaseolus*

vulgaris), broad bean, pea, white lupin, soy-bean, sweet pea, *Vicia villosa*, cowpea and to alsike, crimson, red, and white clovers, as well as to a number of non-leguminous hosts, notably tobacco, *Nicotiana glutinosa*, *Datura stramonium*, chilli, *Petunia hybrida*, cucumber, *Zinnia elegans*, sunflower, *Chenopodium quinoa*, *Tetragonia expansa*, and *Clarkia* sp. Beans reacted for the most part only by local necroses, but the white clover strain usually induced systemic symptoms.

The inactivation temperature was approximately 60° C., the dilution end point ranged from 1 in 5,000 to 1 in 10,000, and longevity *in vitro* extended over a period of 72 hours (96 for one isolate).

The results of premunity tests revealed a relationship between the several strains, which did not, however, confer any cross-protective action against cucumber mosaic virus or a ring spot and tobacco necrosis virus of bean.

A second virus isolated from white clover differed from lucerne mosaic, *inter alia*, in its non-transmissibility to tobacco and other hosts outside the Leguminosae, higher dilution end point (between 1 in 100,000 and 1 in 1,000,000), and longer period of survival (over 20 days) *in vitro*. It presents analogies with the American white clover mosaic virus, especially F. Johnson's pea wilt virus component [21, p. 293].

Field observations point to an extensive distribution of lucerne mosaic virus in Western Germany, and according to P. Grancini (Osservazioni su alcune malattie da virus delle piante. Conferenza Società Agraria di Lombardia 1'8 Maggio 1954. —32 pp., Milan, and *in litt.*) also in the north of Italy. The natural transmission of the virus to chilli, potato, clover, and possibly parsley is discussed.

Sill (W. H.). **Panicum mosaic, a new virus disease of Panicum virgatum and related grasses.**—Abs. in *Phytopathology*, 47, 1, p. 31, 1957.

A virus disease of *Panicum virgatum*, first observed [? in Kansas] in 1953, caused yellow-green mosaic and mottle, diffuse or definite, sometimes accompanied by chlorosis and stunting. The virus was transmitted mechanically to *P. virgatum*, four other *P.* spp., *Digitaria sanguinalis*, *Setaria italica*, and *Echinochloa crus-galli* (a symptomless carrier), but not to cereals. Incubation periods in *D. sanguinalis* were seven to 15 days in warm weather, and longer in cold. Several selections of *P. virgatum* proved resistant.

Allison (J. L.). **Tar spot of annual Korean Lespedeza.**—Abs. in *Phytopathology*, 47, 1, p. 2, 1957.

Though tar spot (*Phyllachora lespedeza*) [36, p. 34] is severe on Korean lespedeza (*L. stipulacea*) throughout North Carolina, *L. striata* and *L. cuneata* are not attacked.

Scaramuzzi (G.). **Saggi colorimetrici per la diagnosi rapida di malattie da virus di fruttiferi.** [Colorimetric tests for the rapid diagnosis of virus diseases of fruit trees.]—*Ann. Sper. agr.*, N.S., 10, 5, pp. 1417–1437, 1956. [English summary.]

In a study conducted at the Italian Cryptogamic Laboratory, Pavia, in 1954 and 1955, tests were made by means of the colorimetric methods of Lindner and his collaborators for the rapid diagnosis of plant virus diseases [31, p. 127] on leaf tissues and wood of almond trees showing various symptoms indicative of a mosaic virus [35, p. 774]; plum trees experimentally inoculated with almond mosaic virus; fig trees affected by mosaic [35, pp. 658, 896]; peach trees with willow leaf rosette virus [35, p. 775]; and apple trees bearing witches' brooms [loc. cit.]. Apparently healthy trees were also tested. The results obtained were so variable that no definite conclusion could be formed as to the validity of the diagnostic methods used.

Beraha (L.), Ramsey (G. B.), Smith (M[arion] A.), & Wright (W. R.). **Gamma radiation for possible control of post harvest diseases of Lemons and Oranges. Gamma radiation for possible control of post harvest diseases of Apples, Strawberries, Grapes, and Peaches.**—Abs. in *Phytopathology*, 47, 1, p. 4, 1957.

In the first of these abstracts it is reported from the Argonne National Laboratory [? Chicago] that *Penicillium digitatum* and *P. italicum* on inoculated lemons and oranges may possibly be controlled by irradiation between 2×10^5 rep. and 1×10^5 rep. [cf. 34, p. 51]. These doses appear either to inactivate the pathogens partially (doses which kill them damage the fruit) or extend the latent period of infection [cf. 36, p. 340].

In the second abstract it is stated that the minimum gamma ray dosage which delayed or suppressed infection in Jonathan apples inoculated with *Penicillium expansum*, incubated for 24 or 96 hours prior to irradiation, and held subsequently for 6 days at 70 to 75° F., was 1×10^5 rep., 2×10^5 being required for 10 days' storage. Similarly the development of *Botrytis cinerea* and *Rhizopus nigricans* [*R. stolonifer*] in strawberries (not inoculated) was checked by 2×10^5 rep. Growth of *B. cinerea* in inoculated grapes was delayed for 10 days by 1×10^6 rep. and 5×10^5 rep. Peaches inoculated with *Monilinia* [*Sclerotinia*] *fructicola* or *R. stolonifer* and irradiated at 2×10^5 to 3×10^5 also remained healthy for 10 days, whereas non-irradiated controls became severely infected within 5 days.

Richter (B.). **Eine Betrachtung über den Apfelschorf.** [A reflection on Apple scab.]—*Pflanzenschutz*, 9, 2, pp. 21–23, 2 figs., 1957.

A tabulated survey is given of the results of spraying experiments in 1956 for the control of apple scab [*Venturia inaequalis*] in an orchard of 30-year-old Beauty of Boskoops in the Bayreuth district of Germany. The most effective schedule comprised six treatments, viz., a dormant one of 4 per cent. yellow carbolineum on 17th March, two pre-blossom of 0·2 per cent. aaventa on 17th and 22nd April, and three post-blossom on 16th May (0·15 per cent. aaventa) and 11th and 26th June (0·4 per cent. kumulus 80 wettable sulphur+0·05 per cent. rapid wetter+0·4 per cent. lead arsenate on both dates). It produced abundant, dark-coloured foliage with 94 per cent. freedom from infection as compared with 14 per cent. in the unsprayed series; reduced severe fruit infection from 26·85 to 0·37 per cent.; and increased the average weight of the fruits from 127·1 to 172·2 gm. and the yield per tree from 14·35 to 121·6 kg.

Satisfactory control was also accomplished by another programme of six treatments, in which normal and strong Bordeaux mixtures were applied at concentrations of 0·6 and 0·1 per cent., respectively, for the two pre-blossom sprays and 1 kg. lime-sulphur was used after flowering, combined with 0·05 per cent. strong Bordeaux on 16th May and with 0·4 per cent. lead arsenate on 11th and 26th June.

Gallucci-Rangone (Maria M.). **Un' infezione da Gloeosporium fructigenum Berk. su Mele e Pere conservate in magazzino.** [An infection by *Gloeosporium fructigenum* Berk. on Apples and Pears in storage.]—*Ann. Sper. agr.*, N.S., 10, 5, pp. 1677–1690, 4 figs., 1 graph, 1956. [English summary.]

An account is given of a study carried out at the Experimental Laboratory of Phytopathology, Turin, and the Plant Pathological Institute of the University, Sassari [Sicily], of an infection of stored Canada Pippin apples and William pears caused by *Gloeosporium fructigenum* [*Glomerella cingulata*: cf. 34, p. 717].

Experimental inoculations of different fruits gave positive results only on apples, pears, and bananas previously wounded by punctures or cuts. On bananas, infection remained confined to the skin; on apples and pears the pulp was involved. Unwounded, inoculated fruits of all species tested remained uninfected. It is concluded that the strain of *G. cingulata* studied is a wound parasite.

Nicolaisen-Scupin (Frau L.). **Studien über Gefrierschäden von Äpfeln.** [Studies on frost damage to Apples.]—*Kältetechnik*, 8, 10, pp. 313–315, 11 figs., 1956.

General information is presented on physiological disorders of stored apples, e.g., internal breakdown and soft scald, caused by low temperatures and frost, illustrated by some concrete examples of these conditions affecting the Rheinischer Bohnapfel and Jonathan varieties in Germany. Attention is further drawn to the secondary invasion of the damaged tissues by [unspecified] fungi.

Millikan (D. F.). **Symptoms of scar skin in Apple.**—Abs. in *Phytopathology*, 47, 1, p. 25, 1957.

Scar skin of apples was first reported in Missouri in 1955 and again in 1956. In early June light, water-soaked blemishes radiate from the calyx end of fruits under $\frac{1}{2}$ in. in diameter. A fortnight later scar tissue develops in the epidermis, especially near the calyx. By July, irregular patches of epidermal scar tissue form on the sides of 1 in. fruits, and finally 50 per cent. of the surface may be blemished. On affected trees every fruit is scarred and much smaller than on unaffected neighbouring trees.

Miller (E. J.). **A note on mercury spray residues in Apples.**—*Plant Path.*, 5, 4, pp. 119–121, 1956.

Analyses in 1955 at the Plant Pathology Laboratory, Harpenden, for mercury residues left in apples (mainly Bramley's Seedling) from seven orchards in Cambridge, Norfolk, and Suffolk, showed that six to eight applications of organomercurial fungicide over the course of the season, with the last application in July, 10 to 13 weeks before picking, left a residue of 0·04 to 0·07 p.p.m. of mercury in the whole fruit when the samples were analysed 27 to 30 weeks after the final application.

Grosclaude (C.). **Recherches sur le chancre du Pêcher causé par Fusicoccum amygdali Delacroix.** [Researches on Peach canker caused by *Fusicoccum amygdali* Delacroix].—*Ann. Inst. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 7, 3, pp. 397–419, 9 figs., 1956.

After referring to earlier investigations by various workers into peach canker caused by *Fusicoccum amygdali* [35, p. 831; 36, p. 252], the author presents an account of the disease, not before reported on peach in Europe, based on observations in south-western France and on two years' studies (with the technical collaboration of J. Simone) at the Centre of Agricultural Studies of the South-West, Gironde, [France]. The work also includes sections dealing with the symptoms of the disease, the author's mycological study of the causal organism, its biological characters in nature, and its control.

The fungus was observed by the author (for the first time in south-western France) in 1954, on peaches only. It had probably long been present, but unrecognized. That the disease has been spreading locally is indicated by the fact that certain very susceptible varieties are no longer grown. Important foci of infection were found in the departments of the Gironde, Lot-et-Garonne, and the Basses-Pyrénées, while others are present in the Landes, Dordogne, Tarn-et-Garonne, and probably elsewhere. Fortunately, spread from one orchard to another appears to be very slow. No variety appears to be completely resistant, and the most susceptible are J. H. Hale and (particularly) Arp Beauty. The control methods recommended consist in improved orchard hygiene and fungicidal spraying with synthetic organic materials [33, p. 678].

Wade (G. C.). **Investigations on brown rot of Apricots caused by Sclerotinia fructicola (Wint.) Rehm. I. The occurrence of latent infection in fruit. II. The**

relationship of the potassium status of Apricot trees to brown rot susceptibility. —*Aust. J. agric. Res.*, 7, 6, pp. 504–515; 516–526, 1 pl., 1 graph, 1956.

In further investigations in Tasmania into brown rot of apricots (*Sclerotinia fructicola*) [cf. 34, p. 794; 36, p. 195], the evidence obtained indicated that infection may occur early in the development of the fruit (probably between full bloom and calyx drop) and remain latent until ripening starts. In all cultures from green fruits of unsprayed trees *S. fructicola* was isolated, though it was obtained only from one of 360 fruits from trees sprayed with thiram at petal fall or full bloom, more than eight weeks before sampling. Inoculations of apricot trees by application of a spore suspension at full bloom and calyx drop induced latent infection in the fruit, whereas inoculations at petal fall and when the fruits were half-grown were ineffective. Fungicidal spraying at petal-fall reduced latent infection considerably, and without it significant control of the disease was not always obtained.

Latent infections were confined to the epidermis, though not to any particular part of the fruit surface. Infection appeared to take place through the stomata.

There was evidence that a substance which inhibited the growth of a contaminating species of *Histoplasma* in culture is present in green apricots, and may maintain *S. fructicola* in a state of latency, disappearing as ripening commences.

In seven experiments over a period of four years a negative regression between incidence of brown rot and the potassium status of the trees was demonstrated in all cases. Regression equations suggested that if the potassium content of apricots could be raised to about 4·6 per cent. in oven-dry leaves, the disease should not occur. It was found difficult to increase the potassium content of trees artificially to approach this amount but regular annual soil dressings of potassium chloride at the rate of 2 lb. per tree gave the best control. The high susceptibility of apricot trees to brown rot in Tasmania would appear to be partly due to their relatively low potassium status.

Scaramuzzi (G.). **Polimorfismo sintomatologico del complesso virosico del Mandorlo conosciuto come mosaico in Puglia. Parte I.** [Symptomatological polymorphism of the virus complex of Almond known as mosaic in Apulia. Part I.]—*Ann. Sper. agr.*, N.S., 10, 5, pp. 1707–1743, 19 figs., 1956. [English summary.]

A full account is presented of observations made from 1952 to 1955 at the Italian Cryptogamic Laboratory, Pavia, and the Institute of Plant Pathology of the University of Bari, on the very varied leaf symptoms shown by young almond trees of the Catuccia, Fragiulio, and Rachele varieties received from nurseries in Apulia and developing, after planting, evident symptoms of mosaic virus [27, p. 245; 35, p. 774]. Observations made in orchards in Apulia in 1955 are also reported. The variability of the symptoms would appear to indicate that a complex of viruses is responsible, presumably the [peach] line pattern virosis complex [21, p. 146; 34, p. 527, *et passim*]. Variability of symptoms would also appear to be attributable to differences in varietal reaction to infection, and to the influence of environmental factors, especially temperature.

Geard (I. D.). **Varietal susceptibility, control and seasonal incidence of Raspberry leaf rust in Tasmania.**—*J. Aust. Inst. agric. Sci.*, 22, 4, pp. 285–288, 1956.

In 1955–6, incidence of yellow leaf rust (*Phragmidium rubi-idaei*) of raspberries [35, p. 689] was very high in the chief raspberry-growing areas of Tasmania. In badly affected plantings of the Lloyd George variety all the lower leaves were affected, up to 2,000 uredosori being found on individual leaflets, but exceptionally heavy rainfall shortly before and during harvesting prevented serious loss of yield.

Observations at the Summerlea Horticultural Research Station demonstrated that the Lloyd George variety and its seedling Meika were very susceptible, with

infection ratings of 33 and 31 per cent., respectively, as against 1 per cent. for Collins Defiant and Norfolk Giant and 0 per cent. for Red Antwerp, Fillbasket, and Taylor [cf. 33, p. 709].

In a spraying trial on Lloyd George the best results were given by two Bordeaux sprays, one at the green tip stage and one at white bud; spraying at white bud only was less effective.

The evidence showed that heavy aecidial infection had occurred in early October and was correlated with the occurrence during the 72 hours of the 7th to 9th, inclusive, of a relative humidity not lower than 87 per cent. (average hourly reading 95 per cent.) and concurrent temperatures never below 10·5° C. (average hourly reading 12°).

Miller (P. M.) & Waggoner (P. E.). **Dispersal of spores of Botrytis cinerea among Strawberries.**—Abs. in *Phytopathology*, 47, 1, pp. 24–25, 1957.

Using a Hirst spore trap in a ½-acre field averaging 10 strawberry fruits infected with *Botrytis cinerea* per foot of row, the number of spores per cu. m. per hour at a height of 18 in. was measured over 10 days. *Botrytis* spores were caught chiefly during periods of high humidity, regardless of rain or time of day. The highest count was 112. Apparently therefore infections must arise mostly from nearby primary inoculum, and the micro-climate below the foliage is more critical than the overall environmental conditions [cf. 35, p. 874].

Flock (R. A.) & Wallace (J. M.). **Fig mosaic transmitted by mite.**—*Calif. Agric.*, 11, 1, p. 12, 1 fig., 1956.

Most of the information in this paper on fig mosaic has been already noticed from another source [34, p. 465]. Mosaic symptoms continued to show on new growth of fig cuttings formed after they had been treated with sulphur and grown in an environment free from the fig mite [*Aceria ficus*]. The symptoms were also transmitted by grafting in the absence of mites.

Graniti (A.). **Prove di lotta contro la 'lebbra' delle Olive in Sicilia con calendari misti, utili anche contro la 'mosca'.** [Tests of the control of Olive 'leprosy' in Sicily with mixed treatments, useful also against Olive fly.]—Reprinted from *Olearia*, 7–8 (*1956*), 16 pp., 4 figs., 12 graphs, 1956. [French and English summaries.]

Further spraying tests carried out in Sicily in 1955 demonstrated that good control of fungal diseases (chiefly *Gloeosporium olivarum*) [36, p. 109] and insect pests of olive trees is given by an insecticidal treatment early in September; a combined fungicidal-insecticidal treatment (1 per cent. neutral Bordeaux mixture or 0·17 per cent. active zineb plus 0·03 per cent. parathion plus wetter) in October (or at the end of September if the weather is very wet); and a fungicidal or, if necessary, a combined treatment at the end of October or the beginning of November. If the weather is exceptionally warm and wet, one further fungicidal treatment may be given.

Malaguti (G.) & Naranjo (E.). **Alternariosis de la Parcha.** [Alternariosis of the Passion Vine.]—*Agron. trop., Maracay*, 5, 2, pp. 111–115, 2 pl., 1955. [Received January, 1957.]

A widespread and serious disease of the passion vine in Venezuela has been identified as due to *Alternaria* sp. The morphology of the causal agent, however, differs somewhat from that of *A. passiflorae* as reported from Australia [33, p. 363], New Zealand [27, p. 116], and East Africa [19, p. 71; 28, p. 246], the conidia measuring 17·50 to 112·20 by 9·18 to 19·42 (average 56·57 by 12·53 μ), and approxi-

mates more closely to that of *A. tenuis* [cf. 35, p. 162]. Spraying with dithane Z-78, manzate, fermate, and phygon XL, at intervals of 10 to 15 days according to rainfall, gave the best control.

MICHIELS (A.). **Le calcul de l'efficacité des fongicides et des insecticides.** [The estimation of the efficacy of fungicides and insecticides.]—*Parasitica*, 12, 3, pp. 57–70, 3 graphs, 1956.

The author draws attention to Le Goupils' statistical method of evaluating experimental results, based on the mathematical analysis of the sigmoid curve obtained with homogeneous lots of individuals (*Ann. Épiphyt.*, 8, pp. 189–210, 1942), and demonstrates its use in estimating the relative efficacy of zineb, captan, and Bordeaux mixture against *Sclerotinia fructicola*. He considers that the method is likely to be of great value in phytopharmacy.

ADAM (A. V.). **The role of amino acids and certain other metabolic agents on the toxicity of copper sulphate to spores of Stemphylium sarcinaeforme (Cav.) Wilts. and Monilinia fructicola (Winter) Honey.**—*Diss. Abstr.*, 16, 9, pp. 1549–1550, 1956.

In fungitoxicity studies at the University of Illinois [cf. 34, p. 661] it was found that water soluble constituents of nutrient media reduced the toxicity of copper sulphate, which, with many metabolites, was an inverse function of the concentration of metabolite present. A number, particularly those possessing amino acid groups, reversed the toxic action of copper sulphate: thus, spores which had received a toxic dose had their capacity to germinate restored by exposure to a solution of the reversing metabolite. Spores of *Monilinia* [*Sclerotinia*] *fructicola* [35, p. 471] in 16 p.p.m. copper sulphate solution for two hours or more could not be restored in this way, nor could those of *Stemphylium sarciniforme* after treatment for three hours or more. Excretory products from the spores were among the metabolites which reduced copper sulphate toxicity, those of *S. sarciniforme* being more effective in reducing 10 ml. of a 16 p.p.m. solution than those of *Sclerotinia fructicola*. Chromatographic studies revealed five active constituents in the former and three in the latter, maximum excretion being reached after 36 and 48 hours, respectively. In neither were these substances demonstrable by chromatography after 156 hours. Many of the metabolites studied were fungitoxic, but most of those which were not stimulated germination.

In tests, 12^5 spores of *S. fructicola* absorbed a lethal dose of copper from the solution in ten minutes, as compared with 50 minutes for the other fungus.

Segundo catálogo general de coleciones micológicas latino-americanas. [Second general catalogue of Latin-American mycological collections.]—109 pp., Montevideo, Uruguay, Centro de Cooperación Cientifica de la UNESCO para América Latina, 1955. [Abs. in *Biol. Abstr.*, 31, 1, p. 213, 1957.]

A list is given of 13 institutions in Latin America whose mycological collections are catalogued in this publication, together with a list of about 100 institutions in various countries from which the strains were obtained. The main part of the catalogue lists the species alphabetically.

MOREAU (C.). **Les maladies parasitaires des principales cultures coloniales. Revue bibliographique. XVII.** [The parasitic diseases of the principal colonial crops. A bibliographical review. XVII.]—*Rev. Mycol., Paris*, 21, *Suppl. colon.* 1, pp. 39–56, 1956.

Further notes are given on the principal diseases of colonial crops [35, p. 531], based on the literature published from 1953 to 1955 (154 titles).

Blumer (S.). **Alte und neue Probleme der Mehltauforschung.** [Old and new problems of mildew research.]—*Ber. PflSchKongr., Berl., 1955*, pp. 161–168, [? 1955. Received February, 1957].

Problems relating to conidial germination, physiologic specialization, and control of the Erysiphaceae, some of which have been in the foreground for 50 years and still await solution, are discussed in the light of 18 contributions to the literature on the subject.

Bertini (S.). **Azione stimolatrice di Penicillium notatum Westling e di altri Penicillium su lo sviluppo e la formazione di sclerozi di Sclerotium rolfsii Sacc.** [The stimulating effect of *Penicillium notatum* Westling and other species of *Penicillium* on growth and sclerotial formation by *Sclerotium rolfsii* Sacc.]—*Ann. Sper. agr.*, N.S. 10, 5, pp. 1575–1579, 2 pl., 1956. [English summary.]

At the Institute of Plant Pathology and Technical and Agricultural Microbiology, University of Pisa, colonies of *Sclerotium rolfsii* growing on Czapek-Dox agar accidentally contaminated by *Penicillium notatum* showed more abundant growth than uncontaminated colonies [cf. 35, p. 36]; in addition, the contaminated colonies showed the presence of numerous sclerotia along the demarcation line between the two organisms. The ability of *P. notatum* to stimulate growth and sclerotial formation by *S. rolfsii* was then demonstrated experimentally, and it was also shown that the same ability characterized many other species of *P.*

Croxall (H. E.). **Use of antibiotics in the control of plant diseases.**—*N.A.A.S. quart. Rev.*, 34 (*1956*), pp. 175–178, 1956.

The author briefly surveys, with frequent reference to the literature (25 titles), the work done in recent years on the use of antibiotics in the control of bacterial and fungus diseases of plants [36, p. 260]. Most of the information has already been noticed in this *Review.*

Moreau (C.) & Moreau (Mireille). **Alliances et antagonismes entre champignons. Leur intérêt pour la compréhension de certains problèmes phytopathologiques.** [Alliances and antagonisms between fungi. Their interest with respect to the understanding of certain phytopathological problems.]—*Bull. Soc. mycol. Fr.*, 72, 3, pp. 251–253, 1956.

The authors briefly note the conditions conducing to wilt diseases of plants and the progressive stages of such. Instancing carnation wilt near Nice, a succession of fungi are involved [cf. 35, p. 893], each species gradually superseding the one present before. The disease is caused primarily by *Phialophora* [*Verticillium*] *cinerescens* and *Fusarium oxysporum* [see above, p. 407], but these two fungi are never isolated at the same time and when grown together in the laboratory display active mutual antagonism.

When *Rhizoctonia* [*Corticium*] *solani* was grown together with *F. roseum*, both from wilted *Phoenix* sp., the former grew vigorously and covered the latter. When a *Phytophthora* sp. and *F. oxysporum* from diseased cinerarias were grown together, the two mycelia intermingled. Other such relationships are cited and discussed.

Taylor (C. F.). **A device for recording the duration of dew deposits.**—*Plant Dis. Reptr*, 40, 12, pp. 1025–1028, 1 fig., 1956.

This apparatus for recording the dew deposits has already been described more briefly from another source [34, p. 309].

Sharma (B. B.) & Saksena (B. N.). **A new technique for the permanent dry preservation of some mycological and plant pathological specimens.**—*Proc. Indian Acad. Sci.*, Sect. B, 44, 5, pp. 276–277, 4 figs., 1956.

At the Botany Department, Lucknow University, the authors have developed

a method for preserving diseased leaves, twigs, and similar materials without obscuring the symptoms of fungal disease. The materials are taken through to absolute alcohol by stages and then transferred to xylol, being afterwards left in a mixture of xylol and Canada balsam in equal proportions for 18 to 72 hours before drying in a hot air chamber at 37° C. until hardened. They are then stored and protected from dust.

STODOLA (F. H.), NELSON (G. E. N.), & SPENCE (D. J.). **The separation of Gibberellin A and gibberellic acid on buffered partition columns.**—*Arch. Biochem.*, 66, 2, pp. 438–443, 1 diag., 1 graph, 1957.

At the Northern Utilization Research Branch, United States Department of Agriculture, Peoria, Illinois, the crude mixture of gibberellins [36, p. 203] produced in the pilot plant by *Gibberella fujikuroi* NRRL 2284 was shown to be separable, by means of buffer partition chromatography, into a gibberellin ($[\alpha]_D+36°$) of composition $C_{12}H_{24}O_6$, and gibberellic acid ($C_{19}H_{22}O_6$).

THOMAS (M. D.). **The invisible injury theory of plant damage.**—*J. Air Pollut. Control Ass.*, 5, 4, 4 pp., 5 graphs, [? 1955].

In this paper, presented at the 48th Annual Meeting of the Air Pollution Control Association at Detroit, Michigan, in May, 1955, the author summarizes present knowledge of the effects of atmospheric pollutants [36, p. 48] in reducing the vigour of plants without producing distinct lesions. He concludes that Stoklasa [3, p. 356] greatly overestimated the role of sulphur dioxide in producing such 'invisible injury' under field conditions. It has been demonstrated on gladiolus and a number of other plants that a concentration of hydrogen fluoride above the threshold for the plant in question reduces photosynthesis, and since fluoride ions are persistent subsequent recovery is slower than from sulphur dioxide. It is emphasized that for both sulphur dioxide and hydrogen fluoride removal of the toxin results in recovery, and while this probably occurs also in the case of coal smoke, which is known to cause reduction of growth under field conditions [31, p. 291], precise information is still lacking.

DURAIRAJ (V.). **Growth of Colletotrichum capsici in pure culture.**—*J. Indian bot. Soc.*, 35, 4, pp. 409–413, 1956.

In a study of an isolate of *Colletotrichum capsici* [cf. 26, p. 141; 35, p. 453] at the University Botany Laboratory, Madras, Richard's medium was found to be the best for growth in pure culture. Growth was accompanied by an increase in the pH value of the medium, the optimum being 7. Sucrose was the best carbon source, followed by glucose, mannose, and laevulose. Of the nitrogen sources used, ammonium phosphate gave maximum mycelial growth, followed by urea and asparagine, ammonium oxalate, and potassium nitrate.

DAS GUPTA (A.) & NANDI (P. N.). **Role of nitrogen concentration on production of perithecia in Penicillium vermiculatum Dangeard.**—*Nature, Lond.*, 179, 4556, pp. 429–430, 1957.

At the Bose Institute, Calcutta, India, a soil strain of *Penicillium vermiculatum* produced fertile perithecia in 2 per cent. malt extract agar but not in a modified Czapek-Dox medium containing 4 per cent. glucose and 0·2 per cent. sodium nitrate. When 1 per cent. malt agar was supplemented separately with the various constituents of the Czapek-Dox medium perithecial production was partially inhibited by glucose and completely so by nitrate, but not by any other constituents. Further tests showed that perithecial formation could occur in a Czapek-Dox medium with nitrate nitrogen at 0·05 or 0·1 per cent. or with equivalent levels of nitrogen in other forms, but not at higher or lower levels, irrespective of the glucose level. The authors conclude that excessive nitrogen may inhibit sexual reproduction in many fungi [cf. 27, p. 289].

ANTIBIOTIC FUNGICIDES IN AGRICULTURE

THE MURPHY CHEMICAL COMPANY wish to bring to the attention of research workers the promising results that have been obtained with Griseofulvin in controlling certain species of pathogenic fungi notably those belonging to the genera Botrytis and Mycosphaerella.

To date Griseofulvin has shown promise against Botrytis spp. on lettuces, strawberries, grapes, and gladioli and against Mycosphaerella on melons.

We invite the co-operation of research workers interested in carrying out trials on these or related fungi.

We also draw attention to the fact that Streptomycin is now on sale for agricultural purposes and details will be sent on request.

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